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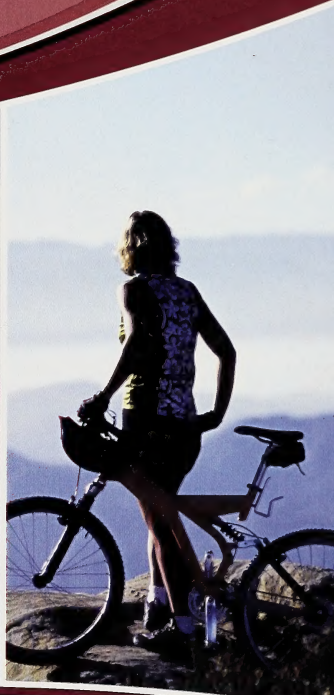
MATHEMATICS 24



Module 2
WHEELS

Learning Technologies Branch

Alberta LEARNING

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MATHEMATICS 24

Module 2
WHEELS

Mathematics 24
Module 2: Wheels
Student Module Booklet
Learning Technologies Branch
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This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	
General Public	
Other	

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- Alberta Learning, **http://www.learning.gov.ab.ca**
- Learning Technologies Branch, **http://www.learning.gov.ab.ca/ltb**
- Learning Resources Centre, **http://www.lrc.learning.gov.ab.ca**

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Welcome to MATHEMATICS 24

Module Two

Mathematics 24 contains six modules. You should work through the modules in order (from 1 to 6) because concepts and skills introduced in one module will be reinforced, extended, and applied in later modules.

Module 1
INDEPENDENT LIVING

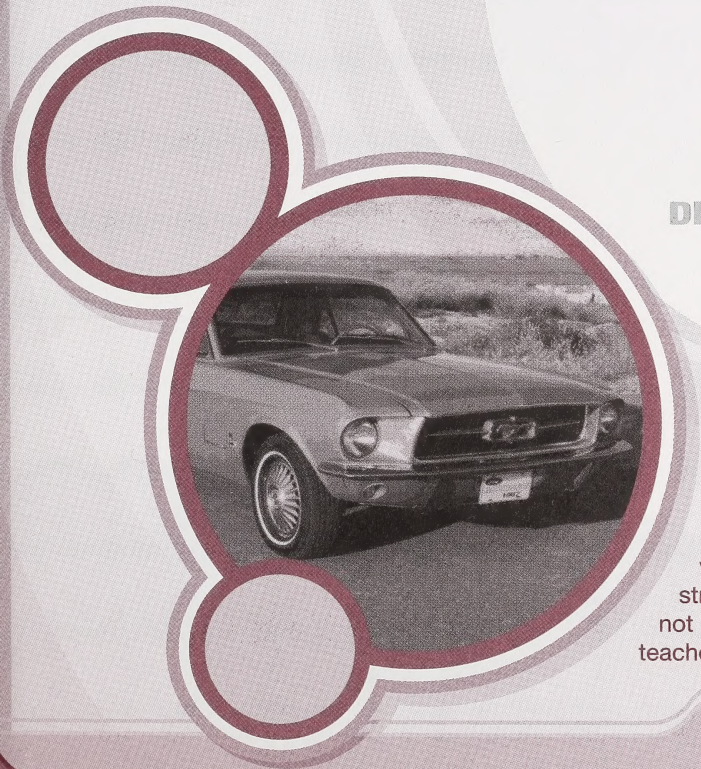
Module 2
WHEELS

Module 3
APPLYING GEOMETRY

Module 4
MAPS, DATA, and PROBABILITY

Module 5
STATISTICS

Module 6
DESIGN and CONSTRUCTION



Module 1 contains general information about the course components, required resources, visual cues, assessment and feedback, and strategies for completing your work. If you do not have access to Module 1, contact your teacher to obtain this important information.

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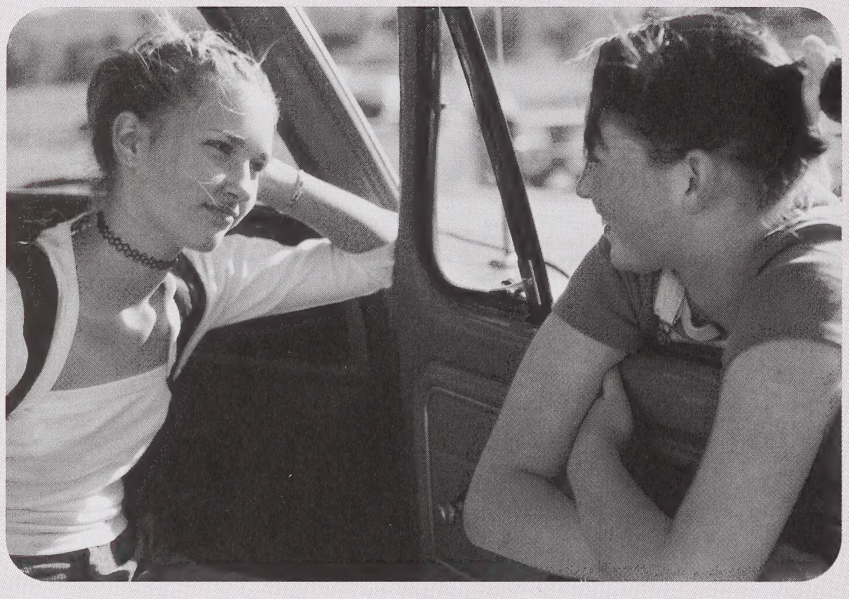
MODULE OVERVIEW

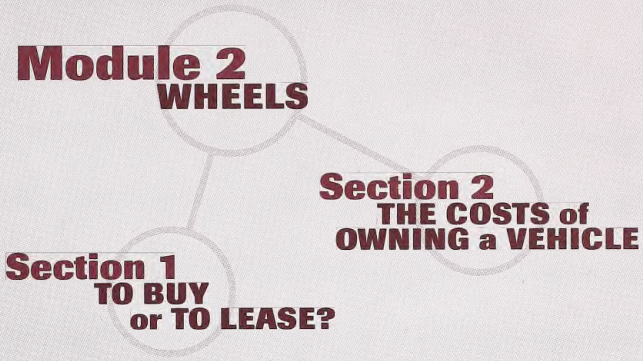


Most teens look forward to learning how to drive, getting their driver's licence, and then getting their own set of wheels. They know that they will have to spend a year or two with a learner's licence and then they'll spend a couple more years with a probationary licence, but at least they'll have some freedom.

If money were no object, what kind of vehicle would you drive? Would it be a sports car, a sedan, a sport-utility vehicle, or a truck? What options would you add on? Would it be a domestic vehicle or an import? What about colour and styling?

For most people, money does count. You have to earn enough to pay for insurance, make the payments, and pay for other things, like gas and repairs. This usually means that owning or leasing a vehicle is out of the question until you have a full-time job!

In this module you will explore purchasing and leasing a vehicle, the cost of financing, and the cost of ownership. To help you in your exploration, you will be using your computer and spreadsheet software.



Your mark on this module will be determined by how well you complete the two Assignment Booklets.

The suggested mark distribution is as follows. Be sure to check with your teacher if this mark allocation is valid for you. Some teachers like to include other reviews and assignments.

Assignment Booklet 2A

Section 1 Assignment	50 marks

Assignment Booklet 2B

Section 2 Assignment	25 marks
Final Module Assignment	25 marks
Total	100 marks

When doing the assignments, work slowly and carefully. Be sure you attempt each part of the assignments. If you are having difficulty, you may use your course materials to help you, but you must do the assignments by yourself.

You will submit Assignment Booklet 2A to your teacher before you begin Section 2. You will submit Assignment Booklet 2B to your teacher at the end of this module.

SECTION 1

To Buy or To Lease?

Few people have enough savings put aside to buy a new vehicle by paying the full amount in cash. Most people either lease their vehicle or take out a loan through the bank or car dealership.

If you or any of your friends are in the market for a new vehicle, you may have discussed the pros and cons of leasing the vehicle versus getting financing to purchase the vehicle outright. What are the arguments for and against each option?

In this section you will investigate some of the issues surrounding leasing and financing. In your investigation you will use your computer and spreadsheet software to see how these choices affect the bottom line—how much you will pay in total and what you will have to show for your payments in the end.

LESSON 1

Buying a Vehicle

In this lesson you will explore a few of the issues involved with purchasing a vehicle. You will use spreadsheets to help you.

Example

Jason is considering buying a new car that is listed at $19 000.00 before taxes. He is currently driving an old truck that his grandfather gave to him.

If Jason trades in his truck, the dealership will give him $8000.00. However, Jason thinks he may be able to get more if he sells the truck privately.

If he were to sell his truck privately, what price should he sell it for in order to be in a better financial position?

If Jason trades in his truck, he will only have to pay GST on the difference between the list price of the new car and the value of the trade-in.

The difference is $19 000.00 – $8000.00 = $11 000.00. The goods and services tax (GST) is 7%.

$$\begin{aligned} 7\% \text{ of } \$11\,000.00 &= 0.07 \times \$11\,000.00 \\ &= \$770.00 \end{aligned}$$

Jason will pay $770.00 in GST if he trades in his truck.

If Jason does not trade in his old truck, he will have to pay GST on the entire list price of the new car.

$$7\% \text{ of } \$19\,000.00 = 0.07 \times \$19\,000.00$$
$$= \$1330.00$$

Jason will pay $1330.00 in GST if he does not trade in his truck.

Therefore, if Jason trades in his truck, he will pay $1330.00 – $770.00 = $560.00 less in GST than he would if he sold his truck privately. Of course, this is simply the GST on $8000.00, the trade-in value.

$$7\% \text{ of } \$8000.00 = 0.07 \times \$8000.00$$
$$= \$560.00$$

Jason would have to sell his truck for more than $8000.00 + $560.00, or $8560.00, in order to be better off selling it privately.

Looking Back

In the previous example, did you calculate the GST by using your calculator?

Most scientific calculators allow you to calculate percentages two different ways. The next example illustrates the keystrokes for the TI-30X IIS calculator.

Example

Determine the GST on a new vehicle with a selling price of $23 000.00. What is the total cost?

Method 1: Convert 7% to a decimal.

Remember, $7\% = \frac{7}{100} = 0.07$.

So, GST = $23 000.00 × 0.07.

Press the following keys on your calculator.

Therefore, the GST is $1610.00.

The total cost is $23 000.00 + $1600.00 = $24 610.00.

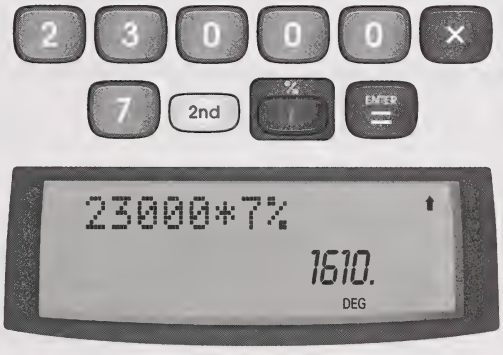
The total cost can also be calculated by multiplying $23 000.00 by 1.07.

$1.07 = 1.00 + 0.07 = 100\% + 7\% = 107\%$

$$\begin{aligned}\text{total cost} &= \$23\,000.00 \times 1.07 \\ &= \$24\,610.00\end{aligned}$$

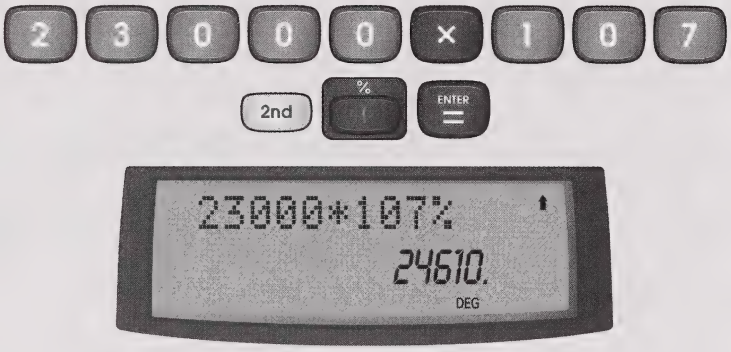
Method 2: Use the percent key.

To find 7% of $23 000.00, press the following keys.



Again, the GST is $1610.00.

The total cost can be found by multiplying by 107%.



The total cost is $24 610.00.

1. Turn to pages 95 and 96 in your textbook. Do questions 1 and 2 of "Investigation: How is the GST calculated?"

Check your answers on pages 52 and 53 in the Appendix.

Spreadsheets are a wonderful tool for analyzing financial data. They provide figures quickly and don't make mathematical errors. But, if you rely on them for "to-the-penny" accuracy, you may be disappointed.

When you were introduced to spreadsheets in Module 1, you used the Round function when calculating interest. This was done so that the rows in the spreadsheets would add up accurately. Without the rounding, you might have seen results like those that follow. Cell C6, which is supposed to be the sum of A6 and B6, is a penny off.

C6 = =A6+B6

	A	B	C
1	**Starting Amount**	**Interest**	**Closing Balance**
2	$1001.00	$65.07	$1066.07
3	$1066.07	$69.29	$1135.36
4	$1135.36	$73.80	$1209.16
5	$1209.16	$78.60	$1287.75
6	$1287.75	$83.70	$1371.46

When using rounding in calculating the interest, this doesn't happen. The following spreadsheet shows the same result with the interest rounded.

B6 = =ROUND(A6*6.5/100,2)

	A	B	C
1	**Starting Amount**	**Interest**	**Closing Balance**
2	$1001.00	$65.07	$1066.07
3	$1066.07	$69.29	$1135.36
4	$1135.36	$73.80	$1209.16
5	$1209.16	$78.60	$1287.76
6	$1287.76	$83.70	$1371.46

Here the rows add up as expected. However, these rounded amounts will probably be a few pennies different from those amounts calculated by financial institutions.

A different form of rounding, often called "banker's rounding," is used by financial institutions. It uses three cases:

- If the "hidden" digit is 0, 1, 2, 3, or 4, the number is unchanged.

  $3.454 → $3.45

- If the "hidden" digit is 5, the number is rounded toward the closest even number.

  $3.455 → $3.46, but $3.445 → $3.44

- If the "hidden" digit is 6, 7, 8, or 9, the number is increased.

  $3.458 → $3.46

With this type of rounding, the halfway digit (5) rounds up half the time and down the other half.

There is a spreadsheet template, Rounds.xlt, in the Spreadsheets folder on the multimedia CD that will let you examine these ways of rounding.

As long as you know that there will be anomalies with sums in spreadsheets, it will be easier for you not to use the Round function with spreadsheets. **In this module you do not need to use the Round function in the spreadsheets you create.**

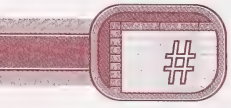
In the next example you will use your computer and spreadsheet software to investigate the cost of a new car.

Before you begin, you will need to master some basic spreadsheet terminology.

- **Rows** run horizontally from left to right and are identified by the numbers on the left side of the spreadsheet.
- **Columns** run vertically from the top of the spreadsheet to the bottom and are identified by the letters at the top of the spreadsheet.
- The intersection of a row and a column is called a **cell**. Each cell is identified by a letter and a number representing the column and row in which it lies. In the textbook illustration, the active cell, which is shown by the outline of a rectangle, lies in column C and row 18. This is cell C18. Its cell name appears in a rectangle in the upper left corner of the spreadsheet, immediately above column A.

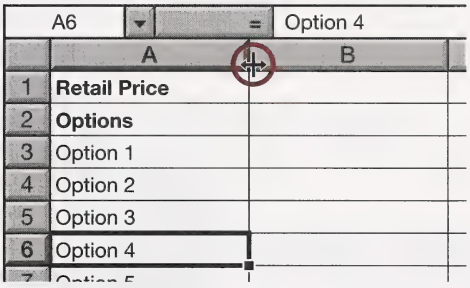
The instructions given in this module are for Microsoft Excel for the Windows operating system. If you are using a different operating system or different software, you should consult your instruction manuals if differences arise.

Turn to pages 96 and 97 in your textbook and read through the example. Now design the spreadsheet as shown in the illustration and described in the example. Refer to the following steps to help you design this spreadsheet.



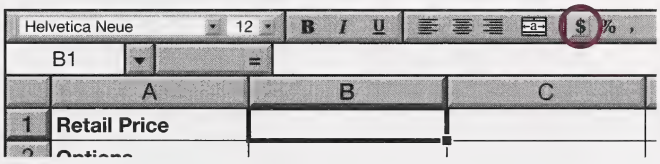
Step 1: Open a new spreadsheet. Notice that the active cell is A1. Type Retail Price and then hit the Enter key. This will activate cell A2. Type Options and hit the Enter key.

Continue by entering the headings that you see in the textbook for cells A3 through A19. After you are done, adjust the width of column A to fully reveal what you typed in these cells. When you click on the line between columns A and B, the cursor changes. You can drag this new cursor to change the width of column A.



Also, to boldface entries (as shown in cells A1, A2, A13, and so on), first click on the cell you wish to boldface and then click on the letter B in the tool bar.

Step 2: Column B contains dollar values. To format this column so that dollar signs automatically appear in front of the numbers you enter, click and drag to highlight cells B1 through B19. Then click on the dollar sign in the tool bar, or use the menus Format—Cells—Currency.



Step 3: Enter the formulas you see in your textbook in cells B15, B17, B18, and B19. Type each formula exactly as you see it. For example, in cell B15 type the following:

=SUM(B1:B14)

Step 4: You are now ready to use the spreadsheet to answer the question outlined in the example. Enter the following values:

- In cell B1, enter 24864.
- In cell B3, enter 324.
- In cell B4, enter 620.
- In cell B5, enter 378.
- In cell B6, enter 260.
- In cell B7, enter 258.
- In cell B8, enter 195.
- In cell B9, enter 621.
- In cell B14, enter 100.
- In cell B16, enter 10250.

The formulas that you entered earlier automatically update the values in cells B15, B17, B18, and B19.

Your spreadsheet should show the following values.

	A	B
1	**Retail Price**	$24864.00
2	**Options**	
3	Option 1	$324.00
4	Option 2	$620.00
5	Option 3	$378.00
6	Option 4	$260.00
7	Option 5	$258.00
8	Option 6	$195.00
9	Option 7	$621.00
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	**Air Conditioning**	$100.00
15	**Sub Total**	$27620.00
16	**Trade-in**	$10250.00
17	**Cost Before GST**	$17370.00
18	**GST**	$1215.90
19	**Cost After GST**	$18585.90

Step 5: Save your vehicle pricing spreadsheet. You will use it as a template (a model) to solve the following questions.

The spreadsheet template, Mod_2_1.xlt, found in the Spreadsheets folder on the multimedia CD, matches the spreadsheet that you just completed.

2. Turn to pages 99 and 100 in your textbook. Do questions 1 to 3 of "Put into Practice."

Check your answers on pages 53 to 57 in the Appendix.

If you have access to the Internet, here are a few websites you can visit to compare new vehicle prices and the costs of options:

- **http://www.toyota.ca/**
- **http://www.honda.ca/**
- **http://www.gmcanada.com/**
- **http://www.ford.ca/**
- **http://www.daimlerchrysler.ca/**

In this lesson you explored buying a new vehicle. Spreadsheet software helped you in your exploration. You should now have the tools you need to start on your assignment.

Turn to the Section 1 Assignment in Assignment Booklet 2A. Answer questions 1, 2, and 3.

LESSON 2

Lesson 2: Leasing a Vehicle

In this lesson you will analyze leasing a vehicle as an alternative to purchasing. Again, you will use a spreadsheet template to help you with your analysis.

Have you ever wondered why you can lease a vehicle for a smaller monthly payment than you would have to pay to buy the vehicle outright? You need to remember that, when the term of the lease is up, you do not own the vehicle. As a matter of fact, if you wanted to own the vehicle at the end of the lease, you would still have to pay the fair market value of the vehicle at the time the lease expires. This is called the **residual value** of the vehicle.

If the original purchase price of the vehicle was $25 000.00 and the residual value after the term of the lease is $10 000.00, then your lease payments would be based on the $25 000.00 – $10 000.00 = $15 000.00 difference.

What you are really doing when you lease this vehicle is borrowing $15 000.00 at the beginning of the lease and paying back this amount plus interest over the term of the lease. You are paying for the **depreciation** of the vehicle. The residual value is also known as the **depreciated value** of the vehicle.

Now you will take a closer look at depreciation. Turn to pages 102 and 103 in your textbook and work through "Example 1: Depreciation" and "Example 2: Using the Depreciation Table."

1. Turn to page 103 in your textbook. Do questions 1 and 2 of "Investigation 1: How do I calculate the depreciation for a given year?"

2. Turn to page 107 in your textbook. Do question 1 of "Put into Practice."

Check your answers on pages 57 and 58 in the Appendix.

Some of the advantages of leasing include lower monthly payments, driving a new vehicle every few years after each lease expires, and not having to sell the vehicle or trade it in at the end of the lease.

One of the main disadvantages of leasing is not owning the vehicle at the end of the lease. If you wanted to keep the vehicle, you would have to pay the residual value at the end of the lease. You would likely end up paying more to own the vehicle in the long run than if you had decided to purchase it right from the beginning.

Now that you have been introduced to leasing, you will prepare a spreadsheet template that you will use to calculate lease payments.

Turn to page 104 in your textbook. Read the introduction to "Example 3: Leasing." You will use the information from this example to create a lease payments spreadsheet.

Step 1: Open a new spreadsheet.

Step 2: Enter these headings in column A. Then adjust the width of column A so the headings are fully displayed.

	A	B
1	**Purchase Price**	
2	**Annual Interest Rate (%)**	
3	**Annual Interest Rate (dec)**	
4	**Monthly Interest Rate**	
5	**Lease Term (months)**	
6	**Residual**	
7	**Monthly Payment**	
8	**Monthly Payment + GST**	

Step 3: In column B, enter the following values and formulas:

- In cell B1, enter 17313.08, the purchase price of the lease vehicle. Format this cell to show dollar amounts.
- In cell B2, enter 8, the annual interest rate.
- In cell B3, enter =B2/100. To change a percent to a decimal, divide by 100.
- In cell B4, enter =B3/12. There are 12 months in a year. To determine the monthly interest rate, divide the annual rate by 12.
- In cell B5, enter 48, the number of months in 4 years.
- In cell B6, enter 7617.76, the residual value of the lease vehicle.
- In cell B7, enter the formula for the monthly lease payment.

  =–PMT(B4,B5,B1,-B6,1)

- In cell B8, enter the formula for the monthly payment plus the 7% GST.

  =1.07*B7

- Select cells B6 to B8. Format these cells to show dollar amounts.

Your spreadsheet should look like this.

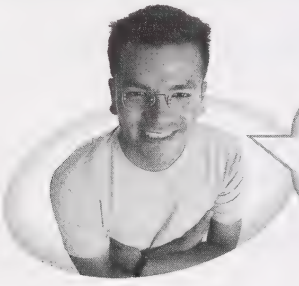
	A	B
1	**Purchase Price**	$17313.08
2	**Annual Interest Rate (%)**	8
3	**Annual Interest Rate (dec)**	0.08
4	**Monthly Interest Rate**	0.00666667
5	**Lease Term (months)**	48
6	**Residual**	$7617.76
7	**Monthly Payment**	$285.57
8	**Monthly Payment + GST**	$305.56

Step 4: Save this lease payments spreadsheet.

The spreadsheet template, Mod_2_2.xlt, found in the Spreadsheets folder on the multimedia CD, matches the spreadsheet that you just completed.

3. Turn to page 105 in your textbook. Complete "Investigation 2: How do you calculate the amount after tax?"

Check your answers on page 59 in the Appendix.



You are now ready to apply your lease template to analyze several leasing scenarios.

Turn to page 106 in your textbook. Work through Example 4.

4. Turn to page 107 in your textbook. Do questions 2 and 3 of "Put into Practice."

Check your answers on pages 59 to 61 in the Appendix.

In this lesson you used a spreadsheet template to explore leasing a vehicle as an alternative to purchasing a vehicle.

Turn to the Section 1 Assignment in Assignment Booklet 2A. Answer question 4.

LESSON 3

Financing a Vehicle

In this lesson you will use a spreadsheet to explore financing the purchase of a new vehicle.

A new vehicle is a major purchase. The vehicle may cost the better part of what you earn over an entire year. Many people end up taking out a loan to finance the purchase of a vehicle. Often, the loan may extend over three, four, or even five years. Monthly payments to repay such a loan are a fact of life for those who wish to drive a new vehicle before they have saved enough money to pay for it with cash.

To explore car loans, you need to be familiar with some of the related terminology.

The amount that you borrow from the bank or finance company is called the **principal** of the loan. When you make your payments to repay this loan, the lending institution charges you an additional amount for the privilege of borrowing their money. This additional charge is called **interest**. It is calculated as a percent of the principal. This percent is called the **interest rate** and is usually expressed as an annual rate.

Example

Alison borrowed $5000.00 from her bank to customize and modify her van. She promised to repay the loan at the end of one year. The bank is charging her 10% interest. How much interest will she be charged?

Solution

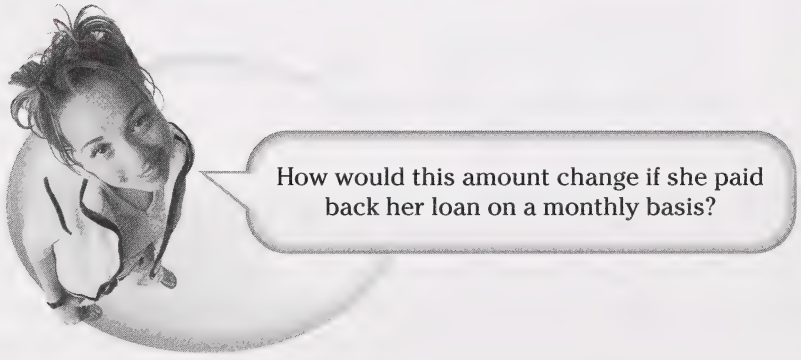
The principal, P, is $5000.00.

The annual interest rate, r, is 10%.

You must determine the interest, I.

$$I = P \times r$$
$$= \$5000.00 \times 10\%$$
$$= \$5000.00 \times 0.10 \quad \leftarrow \text{Recall that } 10\% = \frac{10}{100} = 0.10.$$
$$= \$500.00$$

Alison will have to pay $500.00 in interest, in addition to the $5000.00 she borrowed. The total amount she will have to pay is $5500.00.



You can use the template Mod_2_3.xlt from the Spreadsheets folder on the multimedia CD to find monthly payments for loans.

Example

If Alison had chosen to make 12 equal monthly payments to repay her $5000.00 loan, her monthly payment would have been $439.58. Part of that payment would have been interest and part of the payment would have been towards the principal.

a. How much of her first payment would have been interest?

b. After her first payment, how much of the principal would have been left to pay off?

c. How much interest would she have paid altogether?

Solution

a. In the previous example, the total interest for an entire year was $500.00. In this case, the interest would be $\frac{1}{12}$ of this since one month is $\frac{1}{12}$ of a year.

$$I = \$500.00 \div 12$$
$$= \$41.67$$

You can find this amount using the formula $I = Prt$, where $P = \$5000.00$, $r = 10\%$, and $t = \frac{1}{12}$.

$$I = Prt$$
$$= \$5000.00 \times 0.10 \times \frac{1}{12}$$
$$= \$41.67$$

Remember, if you use the formula $I = Prt$, the interest rate, r, is usually a yearly interest rate. If it is, t must be expressed in years or fractions of years.

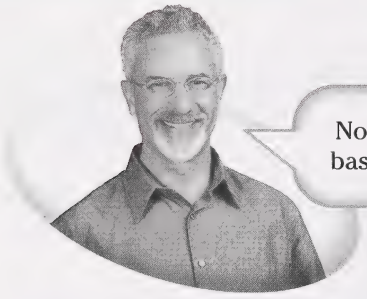
b. At the end of the first month, $41.67 of the $439.58 monthly payment was interest.

Therefore, $439.58 – $41.67 = $397.91 was paid toward the principal.

The original principal was $5000.00. The principal remaining after the first monthly payment would be $5000.00 – $397.91 = $4602.09. This would be the principal on which the interest would be calculated for the second month.

c. Twelve equal payments of $439.58 is a total of $12 \times \$439.58 = \$5274.96$.

Since $5000.00 was principal, $5274.96 – $5000.00 = $274.96 would be the total interest.



Now answer the following questions based on the previous two examples.

1. Why would Alison pay less interest in total if she chose to make monthly payments instead of just one payment at the end of the year?

2. **a.** How much of the $439.58 monthly payment described in the second example would go to interest at the end of the second month?

   b. What principal remains at the end of the second month?

3. Find the interest and principal at the end of the third month.

Check your answers on pages 61 and 62 in the Appendix.

Did you have any problems completing the previous questions? If you did, turn to pages 110 and 111 in your textbook. Work through Example 1.

4. Turn to page 111 in your textbook. Do questions a. and b. of "Investigation 2: How much interest do you pay in the early months?"

5. Turn to page 118 in your textbook. Do questions 1.a., 1.b., 1.e., and 1.g. and question 2 of "Put into Practice."

Check your answers on pages 62 and 63 in the Appendix.

There are many Internet sites where you can determine what your monthly payments would be for any given loan. All you need is the amount of the loan, the annual interest rate, and the length of the loan. If you have access to the Internet, you could check out a couple of these sites:

- **http://autos.canada.com/vancouver/calculators/payment.aspx**
- **http://www.bankrate.com/brm/popcalc2.asp**
- **http://autos.yahoo.com/finance.html**

To find out more about current interest rates, read page 109 in your textbook.

6. Determine the monthly payments for each of the following loans. You can use a loan calculator website if you have access to the Internet.

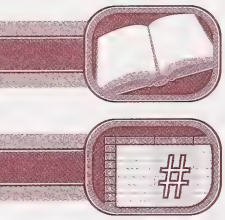
   a. $20 000.00 at 4.9% interest repaid over 36 months
   b. $15 000.00 at 6% interest repaid over 48 months
   c. $15 000.00 at 6% interest repaid over 60 months

7. Why is the monthly payment smaller in question 6.c. than in question 6.b.?

8. In which situation, question 6.b. or question 6.c., do you end up paying more interest? How much more?

Check your answers on pages 63 and 64 in the Appendix.

You can use a spreadsheet to determine what the monthly payments would be for any given loan if you know the principal, interest rate, and length of the loan. Also, you can explore how the interest charged and the amount owing on the loan change from month to month. In the next example you will set up a spreadsheet to analyze a car loan. You will save this spreadsheet and modify it to solve similar problems.



Turn to page 112 in your textbook and read through the first part of the example on this page. Next, examine the spreadsheet that is described on pages 112 to 116 in your textbook. Use the following steps to set up this spreadsheet:

Step 1: Open a new spreadsheet.

Step 2: In column A, enter the headings that you see in the rows 2 through 7 in the spreadsheet in the textbook. Enter the loan data and the following formulas in column B:

- In cell B1, enter 18525. Format this cell to show dollar amounts.
- In cell B2, enter 8.
- In cell B3, enter =B2/100 to change the percent to a decimal.
- In cell B4, enter =B3/12 to change the annual rate to a monthly rate.
- In cell B5, enter 48, the number of months.
- In cell B6, enter the payment formula exactly as you see it.

  =–PMT(B4,B5,B1,0)

  This formula takes the information from cells B3, B4, and B5 to calculate the monthly loan payment. The negative sign subtracts your payment to calculate the new balance. Format this cell to show dollar amounts.

- Enter the headings in cells B7 to F7 to match the ones in the spreadsheet in the textbook.

Your spreadsheet should be similar to the one that follows.

	A	B	C	D	E	F
1	**Amount Borrowed**	$18525.00				
2	**Annual Interest Rate (%)**	8				
3	**Annual Interest Rate (dec)**	0.08				
4	**Monthly Interest Rate**	0.00666667				
5	**Number of Months**	48				
6	**Monthly Payment**	$452.25				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8						

Step 3: Enter the following formulas in row 8:

- In cell A8, enter 1 to represent the first monthly payment.
- In cell B8, enter =B1.
- In cell C8, enter the following formula that calculates the month's interest. This formula multiplies the month's opening balance by the monthly interest rate.

  =$B$4*B8

  The dollar signs are a signal to the spreadsheet that it should not change this cell reference when copying cells.
- In cell D8, enter =B8+C8, which adds the month's opening balance to the month's interest to calculate the amount owed.
- In cell E8, enter =$B$6, which copies and pastes the monthly payment in this cell.
- In cell F8, enter =D8–E8, which subtracts the payment from the amount owed.
- Format cells B8 through F8 to show dollar amounts.

Your spreadsheet should look like the one that follows.

	A	B	C	D	E	F
1	**Amount Borrowed**	$18525.00				
2	**Annual Interest Rate (%)**	8				
3	**Annual Interest Rate (dec)**	0.08				
4	**Monthly Interest Rate**	0.006667				
5	**Number of Months**	48				
6	**Monthly Payment**	$452.25				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$18525.00	$123.50	$18648.50	$452.25	$18196.25

Step 4: Enter the following formulas in row 9:

- In cell A9, enter =A8+1 to represent the second payment.
- In cell B9, enter =F8 since the opening balance is the closing balance from the previous month.
- In cell C9, enter the following formula that calculates this month's interest.

  =$B$4*B9

- In cell D9, enter =B9+C9, which adds the month's opening balance to the month's interest to calculate the amount owed.
- In cell E9, enter =$B$6, which copies and pastes the monthly payment in this cell.
- In cell F8, enter =D9–E9, which subtracts the payment from the amount owed.
- Format cells B9 through F9 to show dollar amounts.

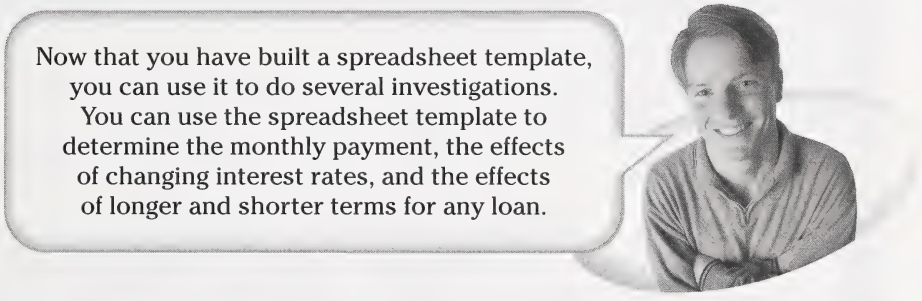
Step 5: Complete the spreadsheet. Highlight cells A9 to F55. Then, from the Edit menu, select Fill and Down.

Your spreadsheet should now look like the one that follows.

	A	B	C	D	E	F
1	**Amount Borrowed**	$18525.00				
2	**Annual Interest Rate (%)**	8				
3	**Annual Interest Rate (dec)**	0.08				
4	**Monthly Interest Rate**	0.00666667				
5	**Number of Months**	48				
6	**Monthly Payment**	$452.25				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$18525.00	$123.50	$18648.50	$452.25	$18196.25
9	2	$18196.25	$121.31	$18317.56	$452.25	$17865.31
10	3	$17865.31	$119.10	$17984.41	$452.25	$17532.16
11	4	$17532.16	$116.88	$17649.04	$452.25	$17196.79
12	5	$17196.79	$114.65	$17311.44	$452.25	$16859.19

45	38	$4781.37	$31.88	$4813.25	$452.25	$4361.00
46	39	$4361.00	$29.07	$4390.07	$452.25	$3937.82
47	40	$3937.82	$26.25	$3964.07	$452.25	$3511.82
48	41	$3511.82	$23.41	$3535.24	$452.25	$3082.99
49	42	$3082.99	$20.55	$3103.54	$452.25	$2651.29
50	43	$2651.29	$17.68	$2668.97	$452.25	$2216.72
51	44	$2216.72	$14.78	$2231.49	$452.25	$1779.24
52	45	$1779.24	$11.86	$1791.11	$452.25	$1338.86
53	46	$1338.86	$8.93	$1347.78	$452.25	$895.53
54	47	$895.53	$5.97	$901.50	$452.25	$449.25
55	48	$449.25	$3.00	$452.25	$452.25	$0.00

Step 7: Save this loan payment spreadsheet.


Now that you have built a spreadsheet template, you can use it to do several investigations. You can use the spreadsheet template to determine the monthly payment, the effects of changing interest rates, and the effects of longer and shorter terms for any loan.

The spreadsheet template, Mod_2_4.xlt, found in the Spreadsheets folder on the multimedia CD matches the spreadsheet you just completed.

Example

Jamie is applying for a $20 000.00 new-car loan. The finance company offered him a choice of a 36-month loan or a 48-month loan. The annual interest rate is 6% in each case. Use your loan payment spreadsheet to determine the monthly payments and the total interest paid in each case.

Solution

First, find the monthly payment and total interest paid for the 36-month loan.

Open your loan payment spreadsheet template. Then enter the following values:

- In cell B1, enter 20000.
- In cell B2, enter 6.
- In cell B5, enter 36.
- Clear the entries from all the cells beyond 36 payments.

The monthly payment is automatically shown as $608.44. To find the total interest paid, subtract $20 000.00 from the total of the 36 monthly payments.

$$\text{total interest} = (36 \times \$608.44) - \$20\,000.00$$
$$= \$1903.84$$

Another method to determine the total interest is to find the sum of the entries in column C. In cell C44, enter =sum(C8:C43). The sum is $1903.79. The small difference arises because of rounding to the nearest cent in the body of the spreadsheet. $1903.84 is more accurate, but both answers would be accepted as being correct.

Your spreadsheet should look like the one that follows.

	A	B	C	D	E	F
1	**Amount Borrowed**	$20000.00				
2	**Annual Interest Rate (%)**	6				
3	**Annual Interest Rate (dec)**	0.06				
4	**Monthly Interest Rate**	0.005				
5	**Number of Months**	36				
6	**Monthly Payment**	$608.44				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$20000.00	$100.00	$20100.00	$608.44	$19491.56
9	2	$19491.56	$97.46	$19589.02	$608.44	$18980.58
10	3	$18980.58	$94.90	$19075.48	$608.44	$18467.04
11	4	$18467.04	$92.34	$18559.38	$608.44	$17950.94
12	5	$17950.94	$89.75	$18040.70	$608.44	$17432.26
13	6	$17432.26	$87.16	$17519.42	$608.44	$16910.98
14	7	$16910.98	$84.55	$16995.53	$608.44	$16387.10
15	8	$16387.10	$81.94	$16469.03	$608.44	$15860.59
16	9	$15860.59	$79.30	$15939.90	$608.44	$15331.46
17	10	$15331.46	$76.66	$15408.11	$608.44	$14799.68
18	11	$14799.68	$74.00	$14873.67	$608.44	$14265.23
19	12	$14265.23	$71.33	$14336.56	$608.44	$13728.12
20	13	$13728.12	$68.64	$13796.76	$608.44	$13188.32
21	14	$13188.32	$65.94	$13254.27	$608.44	$12645.83
22	15	$12645.83	$63.23	$12709.06	$608.44	$12100.62
23	16	$12100.62	$60.50	$12161.12	$608.44	$11552.68
24	17	$11552.68	$57.76	$11610.44	$608.44	$11002.01
25	18	$11002.01	$55.01	$11057.02	$608.44	$10448.58
26	19	$10448.58	$52.24	$10500.82	$608.44	$9892.38
27	20	$9892.38	$49.46	$9941.84	$608.44	$9333.40
28	21	$9333.40	$46.67	$9380.07	$608.44	$8771.63
29	22	$8771.63	$43.86	$8815.49	$608.44	$8207.05
30	23	$8207.05	$41.04	$8248.09	$608.44	$7639.65

29	22	$8771.63	$43.86	$8815.49	$608.44	$8207.05
30	23	$8207.05	$41.04	$8248.09	$608.44	$7639.65
31	24	$7639.65	$38.20	$7677.85	$608.44	$7069.41
32	25	$7069.41	$35.35	$7104.76	$608.44	$6496.32
33	26	$6496.32	$32.48	$6528.80	$608.44	$5920.36
34	27	$5920.36	$29.60	$5949.96	$608.44	$5341.52
35	28	$5341.52	$26.71	$5368.23	$608.44	$4759.79
36	29	$4759.79	$23.80	$4783.59	$608.44	$4175.15
37	30	$4175.15	$20.88	$4196.03	$608.44	$3587.59
38	31	$3587.59	$17.94	$3605.53	$608.44	$2997.09
39	32	$2997.09	$14.99	$3012.07	$608.44	$2403.63
40	33	$2403.63	$12.02	$2415.65	$608.44	$1807.21
41	34	$1807.21	$9.04	$1816.25	$608.44	$1207.81
42	35	$1207.81	$6.04	$1213.85	$608.44	$605.41
43	36	$605.41	$3.03	$608.44	$608.44	$0.00
44			$1903.79			
45						

Next, find the monthly payment and total interest paid for the 48-month loan.

Enter 48 in B5.

Fill the entries down to include 48 payments.

The monthly payment is automatically shown as $469.70. To find the total interest paid, subtract $20 000.00 from the total of the 48 monthly payments.

$$\begin{aligned}\text{total interest} &= (48 \times \$469.70) - \$20\,000.00 \\ &= \$2545.60\end{aligned}$$

Your spreadsheet should look like the one that follows.

	A	B	C	D	E	F
1	**Amount Borrowed**	$20000.00				
2	**Annual Interest Rate (%)**	6				
3	**Annual Interest Rate (dec)**	0.06				
4	**Monthly Interest Rate**	0.005				
5	**Number of Months**	48				
6	**Monthly Payment**	$469.70				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$20000.00	$100.00	$20100.00	$469.70	$19630.30
9	2	$19630.30	$98.15	$19728.45	$469.70	$19258.75
10	3	$19258.75	$96.29	$19355.04	$469.70	$18885.34
11	4	$18885.34	$94.43	$18979.77	$469.70	$18510.07
12	5	$18510.07	$92.55	$18602.62	$469.70	$18132.92

48	41	$3674.45	$18.37	$3692.82	$469.70	$3223.12
49	42	$3223.12	$16.12	$3239.24	$469.70	$2769.54
50	43	$2769.54	$13.85	$2783.38	$469.70	$2313.68
51	44	$2313.68	$11.57	$2325.25	$469.70	$1855.55
52	45	$1855.55	$9.28	$1864.83	$469.70	$1395.13
53	46	$1395.13	$6.98	$1402.10	$469.70	$932.40
54	47	$932.40	$4.66	$937.06	$469.70	$467.36
55	48	$467.36	$2.34	$469.70	$469.70	$0.00
56			$2545.63			

As you can see, entering =sum(C8:C55) in cell C56 gives you a total of $2545.63. Again, the small difference is due to rounding to the nearest cent in the spreadsheet.

Changing the loan from 36 to 48 months reduces the monthly payment from $608.44 to $469.70, but increases the total interest paid from $1903.84 to $2545.60.

A spreadsheet is a powerful tool for analyzing how a loan is paid off. The process of paying off a debt is called **amortization**. In the next set of questions, you will use your amortization spreadsheet.

9. Turn to pages 118 and 119 in your textbook. Do questions 3 and 4 of "Put into Practice."

Check your answers on pages 64 to 71 in the Appendix.

Turn to the Section 1 Assignment in Assignment Booklet 2A. Answer questions 5 and 6.

LESSON 4

Buy or Lease?

In this lesson you will explore some of the issues that should be considered when deciding to lease or buy. You will use spreadsheets in your exploration.

When you decide to buy or to lease, your decision should be based on more than just the flip of a coin. Following are some of the questions you need to consider:

Leasing

- What lengths of lease are available? Can you lease the vehicle over three, four, or five years?
- What is the interest rate on the lease?
- What will your monthly payments be? Are they less than payments for purchasing the vehicle outright?
- How much will you pay over the entire term of the lease?

- What is the residual value of the vehicle at the end of the lease? Remember, when you lease a vehicle, you are borrowing money to cover the vehicle's depreciation over the term of the lease. To own the vehicle, you will have to pay the residual value when the lease expires.

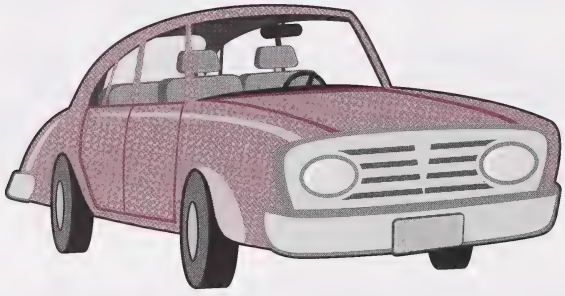
- If you are thinking of purchasing the vehicle when the lease expires, how will you pay the residual? Can you save the amount for the residual while you are making your lease payments, or will you have to borrow money to purchase the vehicle when the lease expires?

Buying

- Can you afford your monthly payments?

- How long are you thinking of owning the vehicle? How much will the vehicle depreciate when you finally sell it or trade it in for a another vehicle?

- How much will you save if you choose to buy instead of leasing and then buying the vehicle when the lease expires?



Turn to pages 120 and 121 in your textbook. Read the introduction on page 120 and then read through the example on page 121. To complete this lesson, you will need to set up a spreadsheet as described in this example. Follow these steps:

Step 1: Open a new spreadsheet.

Step 2: In column A, enter the headings that you see in the rows 1 through 7 in the spreadsheet in the textbook. Enter your investment data and the following formulas in column B:

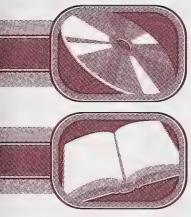
- In cell B1, enter 0. Format this cell using the dollar sign in the tool bar. You will make your first deposit at the end of the month.

- In cell B2, enter 2.

- In cell B3, enter =B2/100 to change the percent to a decimal.
- In cell B4, enter =B3/12 to change the annual rate to a monthly rate.
- In cell B5, enter 48.
- In cell B6, enter 8721.57. Format this cell to show dollar amounts.
- In cell B7, enter the formula =–PMT(B4,B5,– B1,B6,1).

	A	B
1	**Starting Amount**	$0.00
2	**Annual Interest Rate (%)**	2
3	**Annual Interest Rate (dec)**	0.02
4	**Monthly Interest Rate**	0.001667
5	**Savings Term (months)**	48
6	**Residual + GST**	$8721.57
7	**Monthly Deposit**	$174.39

Step 3: Save your spreadsheet. You will use this spreadsheet to answer the following questions.



The spreadsheet template, Mod_2_5.xlt, found in the Spreadsheets folder on the multimedia CD, matches the spreadsheet you just completed.

1. Turn to page 122 in your textbook. Work through "Investigation: What will it cost Vicky if she leases and pays the residual?"
2. Turn to pages 122 and 123 in your textbook. Do questions 1 to 3 of "Put into Practice."

Check your answers on pages 71 to 74 in the Appendix.

the Section 1 Assignment in Assignment Booklet 2A. Answer question 7.

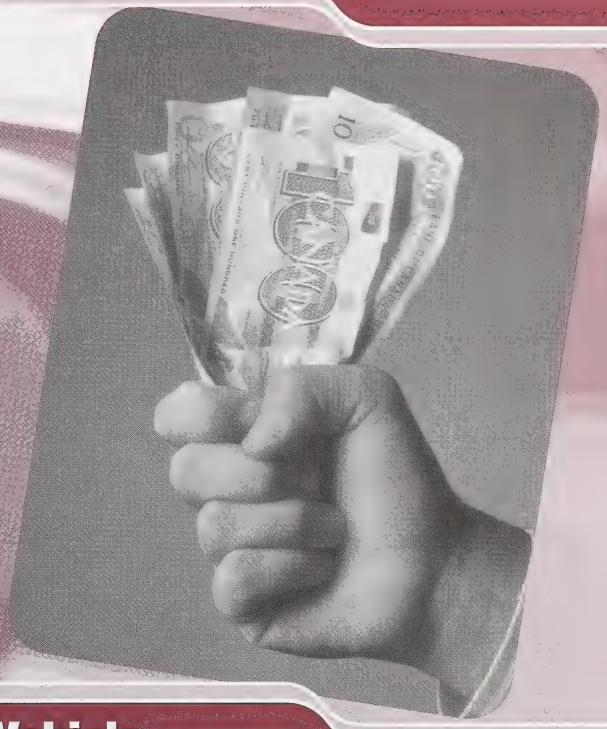
When you are done, submit Assignment Booklet 2A to your teacher to be marked.

CONCLUSION

In this section you explored several of the issues surrounding leasing or financing a vehicle. In your exploration you designed, modified, and applied spreadsheet templates. These templates involved the prices of new vehicles and vehicle trades, financing a vehicle purchase, and monthly lease rates. These templates are some of the tools that you can use to make informed decisions about a new vehicle.

Have you thought of purchasing or leasing a new vehicle? Whether you buy or lease a new or used vehicle, your decision will depend on your styling and model preferences, how you will use the vehicle, and, of course, your present financial position and your future income. The initial cost of a vehicle is only part of the expense you will encounter when you lease or buy.

SECTION 2



The Costs of Owning a Vehicle

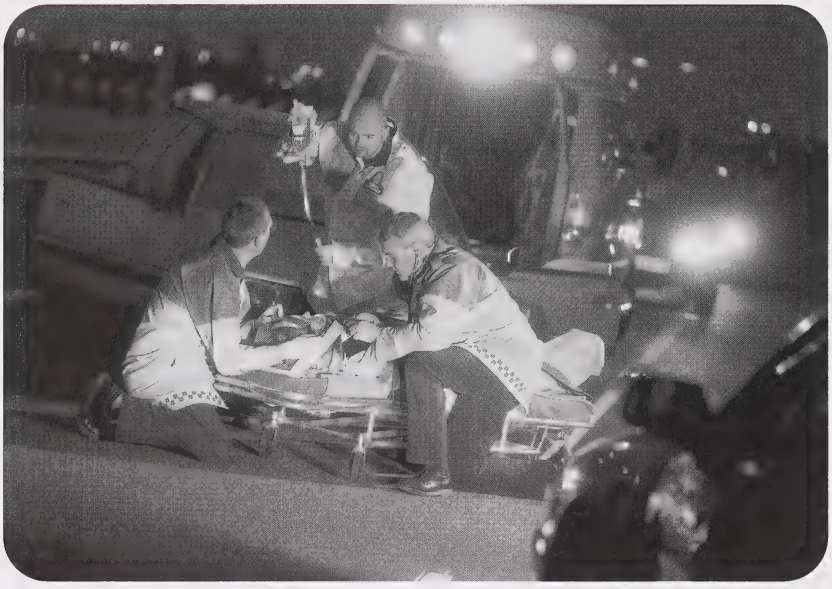
The cost of owning a vehicle can consume a significant portion of your income. The costs of financing or leasing may in fact be a small part of your overall expenses. For one thing, a vehicle is a declining asset. Over time, its value declines and, when the time comes for you to sell the vehicle, you may get far less from its sale than you paid for it. As well, you must pay for gas, parking, regular maintenance, repairs, registration, licensing, and insurance.

In this section you will explore some of these costs. As well, you will investigate insurance, depreciation, repairs, and maintenance. As in Section 1, you will use spreadsheets as one of the tools in your exploration.

LESSON 1

Vehicle Insurance

In this lesson you will explore vehicle insurance.



Before you can drive a car or truck legally, you must have automobile insurance. Automobile insurance protects you against financial loss if your vehicle is damaged in an accident or through vandalism or if the vehicle is stolen. Your insurance also protects others whose property may be damaged or who may be injured in an accident for which you are at fault.

In any given year, upwards of 400 000 Canadian teenagers seek automobile insurance. Because of the increasing costs of automobile repairs, expensive legal costs, and high injury and property settlements, insurance premiums for young people are rising. Did you know that about 20% of newly licensed male drivers and about 15% of newly licensed female drivers are involved in an accident in their first year of driving? As a result, automobile insurance can cost several thousand dollars a year!

Automobile insurance premiums may vary depending on your coverage; your gender, age, and driving record; and whether you have made insurance claims in the past.

Most automobile insurance policies have three main types of coverage:

- The first type of coverage is **collision coverage**. It pays for damage to your vehicle in an accident that is your fault. There is usually a **deductible**. You pay this amount before the insurance company pays for anything.

  Suppose the deductible of your policy is $500.00. If you cause an accident, you would have to pay any damages to your vehicle that are less than $500.00. Your insurance company would **deduct** $500.00 from the repair bill and then they would pay this smaller amount. That is where the name *deductible* comes from.

  Some people who drive older vehicles may choose not to include collision coverage in their policy. Their vehicle could be worth less than a deductible they could afford.

- The second type of coverage is **personal and property liability coverage**. This covers you for damages or injuries to others if an accident is your fault. Because of high legal settlements, many insurance experts advise that you have between $1 000 000 and $5 000 000 of this type of coverage. This coverage is also called **third-party liability coverage**.

- The third type of coverage is called **comprehensive coverage**. This coverage may include glass coverage and certain other specified perils.

Some ways to keep your insurance costs down include the following:

- taking driving lessons from a certified driving school
- maintaining a clean driving record (no traffic tickets)
- having a B average or better (This could save you up to 20%!)
- having no insurance claims for the last five years (i.e., a good claims record)

If you have access to the Internet, you can find out more about the different types of automobile insurance premiums at the following websites:

- **http://www.insurance-canada.ca/**
- **http://www.iicc.ca/**

You will now use your investigative skills to answer a variety of vehicle insurance questions.

Turn to page 124 in your textbook. Read the introduction. Then turn to page 125 and do questions a. to f.

Check your answers on page 74 in the Appendix.

If you have access to the Internet, you can find out more about auto insurance in Alberta at the following website:

http://www.autoinsurance.gov.ab.ca/

Turn to the Section 2 Assignment in Assignment Booklet 2B. Answer question 1.

LESSON 2

Other Costs of Ownership

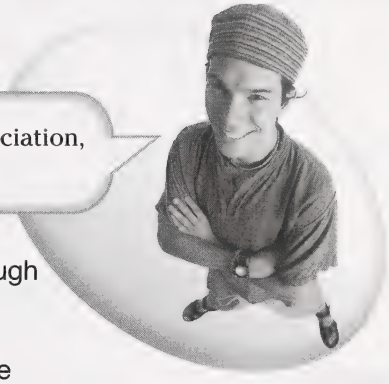
In this lesson you will explore additional costs of vehicle ownership.

As soon as you purchase a vehicle, its value begins to decline. In most cases, the car or truck you buy today will be worth less tomorrow. This cost of vehicle ownership is called depreciation. Not all vehicles depreciate at the same rate. However, in general, vehicles depreciate the most in their first year—often 30%. For example, if a new vehicle costs $20 000.00, an estimate of its value one year later would be 100% – 30%, or 70% of this price.

$$\begin{aligned} 70\% \text{ of } \$20\,000.00 &= 0.70 \times \$20\,000.00 \\ &= \$14\,000.00 \end{aligned}$$

The loss in value, or depreciation, is $20 000.00 – $14 000.00 = $6000.00.

This is a "cost of ownership" of $6000.00 ÷ 12, or $500.00 per month. This would be in addition to your financing costs. If it is any comfort, a car does not lose its value at the same rate every year, at least in terms of its original cost.



Turn to page 126 in your textbook. Work through Example 1.

To set up your depreciation template using the depreciation rates from Example 1, follow these steps:

Step 1: Open a new spreadsheet.

Step 2: Enter these headings in column A:

- In cell A1, enter Age (years).
- In cell A2, enter New.
- In cell A3, enter 1 year.
- In cell A4, enter 2 years.
- In cell A5, enter 3 years.
- In cell A6, enter 4 years.
- In cell A7, enter 5 years.

	A	B
1	**Age (years)**	
2	New	
3	1 year	
4	2 years	
5	3 years	
6	4 years	
7	5 years	

Step 3: Format cells B2 through B7 to show dollar amounts. Enter the following information and formulas in column 2:

- In cell B1, enter Value ($).
- In cell B2, enter the value of the new vehicle, 38225.
- In cell B3, enter =B2*0.7.
- In cell B4, enter =B2*0.57.

- In cell B5, enter =B2*0.5.
- In cell B6, enter =B2*0.44.
- In cell B7, enter =B2*0.39.

Your spreadsheet should look like the one that follows.

	A	B
1	**Age (years)**	**Value ($)**
2	New	$38225.00
3	1 year	$26757.50
4	2 years	$21788.25
5	3 years	$19112.50
6	4 years	$16819.00
7	5 years	$14907.75

Step 4: Save this depreciation spreadsheet.

The spreadsheet template, Mod_2_6.xlt, found in the Spreadsheets folder on the multimedia CD, matches the spreadsheet you just completed.

1. Turn to page 127 in your textbook. Answer questions 1 and 2 of "Put into Practice 1." Use your depreciation spreadsheet template.

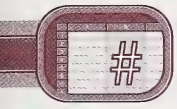
Check your answers on pages 74 and 75 in the Appendix.

Another method of calculating depreciation is used by businesses when preparing tax returns. The depreciation of vehicles used for business is one of the expenses businesses use when determining their taxable income.

Most often, businesses choose to depreciate vehicles at a set percentage each year, usually 30%.

Example

Randall operates a business from his home. He uses a car in his business that he purchased for $35 000.00. Each year when he prepares his taxes, he depreciates the car 30%, based on its value at the end of the previous tax year. Create a spreadsheet to determine the depreciation and the depreciated value of Randall's car at the end of the fifth year.



Step 1: Open a new spreadsheet.

Step 2: Enter the following headings and the given data. (**Remember:** Format cells for $ where applicable. For this example, format columns B, C, and D for currency ($). Resize columns when necessary.)

	A	B	C	D
1	**Vehicle Depreciation for Tax Purposes**			
2				
3	**Purchase Price**	$35000.00		
4	**Depreciation Rate (%)**	30		
5				
6	**Number of Years**	**Initial Value**	**Depreciation**	**Value at End of the Year**
7				

Step 3: Enter the following values and formulas in row 7:

- In cell A7, enter 1.
- In cell B7, enter =$B$3.
- In cell C7, enter =B7*$B$4/100. This calculates the annual depreciation.
- In cell D7, enter = B7–C7. To determine the year-end value, you must subtract the depreciation from the vehicle value at the beginning of the year.

	A	B	C	D
1	**Vehicle Depreciation for Tax Purposes**			
2				
3	**Purchase Price**	$35000.00		
4	**Depreciation Rate (%)**	30		
5				
6	**Number of Years**	**Initial Value**	**Depreciation**	**Value at End of the Year**
7	1	$35000.00	$10500.00	$24500.00
8				

Step 4: Enter the following values and formulas in row 8:

- In cell A8, enter =A7+1. This formula increases the year number by 1.
- In cell B8, enter =D7.
- In cell C8, enter =B8*$B$4/100. This calculates the annual depreciation.
- In cell D8, enter =B8–C8 to determine the year-end value.
- Fill down for 5 years.

	A	B	C	D
1	**Vehicle Depreciation for Tax Purposes**			
2				
3	**Purchase Price**	$35000.00		
4	**Depreciation Rate (%)**	30		
5				
6	**Number of Years**	**Initial Value**	**Depreciation**	**Value at End of the Year**
7	1	$35000.00	$10500.00	$24500.00
8	2	$24500.00	$7350.00	$17150.00
9	3	$17150.00	$5145.00	$12005.00
10	4	$12005.00	$3601.50	$8403.50
11	5	$8403.50	$2521.05	$5882.45
12				

The depreciation at the end of five years is $2521.05 and the value of the vehicle at the end of the fifth year is $5882.45.

Step 5: Save your spreadsheet.

The spreadsheet template, Mod_2_7.xlt, found in the Spreadsheets folder on the multimedia CD, matches the spreadsheet you just completed.

2. Gladue Glass purchased a van for their business for $45 000.00. Using an annual depreciation rate of 30% and the spreadsheet you created in the previous example, calculate the depreciation of this van in its eighth year.

Check your answers on page 75 in the Appendix.

Another major cost of owning a car is gasoline. In the next example, you will prepare a spreadsheet to estimate fuel cost.

Example

Donald purchased a SUV. This vehicle consumes fuel at the rate of 12L/100 km. This means for every 100 km driven, the SUV burns 12 L of gasoline. Donald estimates he will drive this vehicle 1000 km per month and that gasoline will average 74.9¢ per litre. Create a spreadsheet to calculate Donald's fuel costs.

Step 1: Open a new spreadsheet.

Step 2: Enter the following headings in column A:

	A	B
1	**Fuel Costs**	
2		
3	**Distance Driven**	
4	**Fuel Consumption Rate/100 km**	
5	**Cost per Litre**	
6	**Total Cost**	

Step 3: Enter the following information and formulas in column B:

- In cell B3, enter 12000.
- In cell B4, enter 12.
- In cell B5, enter 74.9.
- In cell B6, enter =B3/100*B4*B5/100.

	A	B
1	**Fuel Costs**	
2		
3	**Distance Driven**	12000
4	**Fuel Consumption Rate/100 km**	12
5	**Cost per Litre**	74.9
6	**Total Cost**	$1078.56

The annual cost of gasoline is about $1078.56.

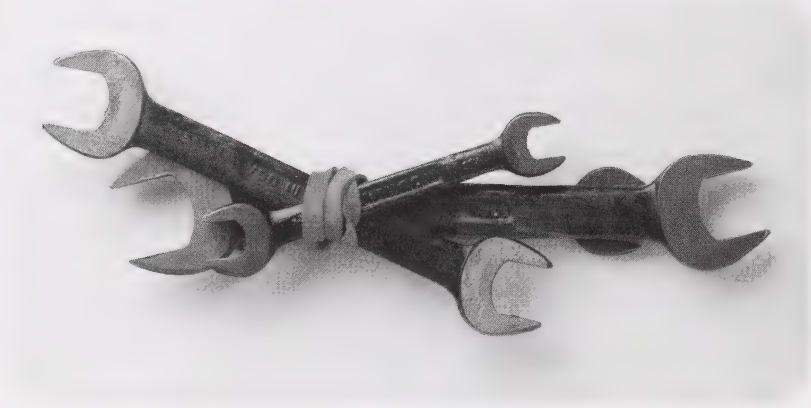
Step 4: Save your spreadsheet.

The spreadsheet template, Mod_2_8.xlt, found in the Spreadsheets folder on the multimedia CD, matches the spreadsheet you just completed.

3. Lise is planning a trip to Ontario. She estimates she will drive 6200 km on the entire trip. She can drive her economy car, which averages 6.5 L/100 km, or she can borrow her parent's van, which averages 11.8 L/100 km. If the average cost of gasoline is 76¢/L, use the fuel template you created to determine how much she would save if she drove her own car.

Check your answers on pages 75 and 76 in the Appendix.

Yet another major cost of vehicle ownership is routine maintenance and unexpected repairs.



Turn to pages 127 to 130 in your textbook and work through "Example 2: Repair Bills." To answer the following questions, you will modify the spreadsheet template from this example.

4. Turn to page 131 in your textbook. Do questions 3 to 6 of "Put into Practice 2."

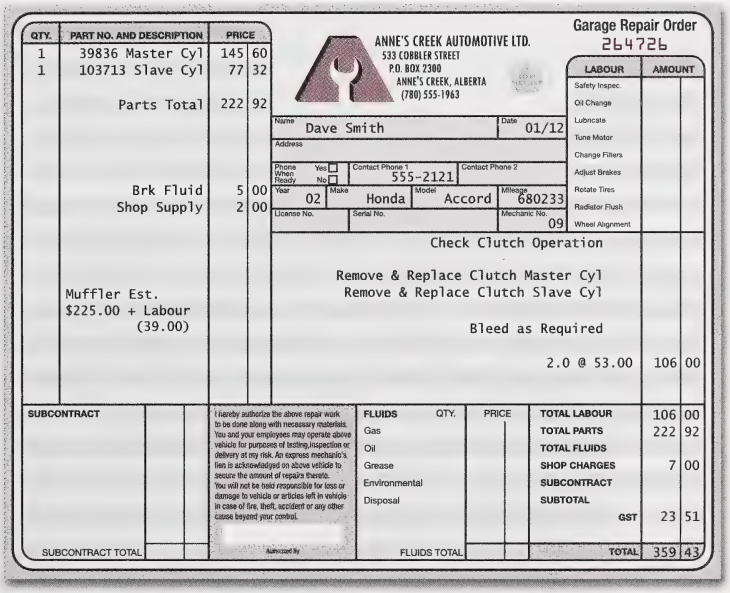
Check your answers on pages 76 to 78 in the Appendix.

In this lesson you explored a number of costs of vehicle ownership.

the Section 2 Assignment in Assignment Booklet 2B. Answer questions 2 to 4.

CONCLUSION

In this section you explored a variety of costs associated with vehicle ownership. You investigated auto insurance—what some of your insurance options are and how these options affect the premiums you pay. As well, you examined vehicle depreciation, gasoline costs, maintenance, and repair. You created and applied several spreadsheet templates to assist you in your exploration.



ANNE'S CREEK AUTOMOTIVE LTD.
533 COBBLER STREET
P.O. BOX 2300
ANNE'S CREEK, ALBERTA
(780) 555-1963

Garage Repair Order
264726

QTY.	PART NO. AND DESCRIPTION	PRICE
1	39836 Master Cyl	145 60
1	103713 Slave Cyl	77 32
	Parts Total	222 92
	Brk Fluid	5 00
	Shop Supply	2 00
	Muffler Est. $225.00 + Labour (39.00)	

Name: Dave Smith
Date: 01/12
Address:
Phone When Ready: Yes ☐ No ☐
Contact Phone 1: 555-2121
Contact Phone 2:
Year: 02
Make: Honda
Model: Accord
Mileage: 680233
License No.:
Serial No.:
Mechanic No.: 09

LABOUR	AMOUNT
Safety Inspec.	
Oil Change	
Lubricate	
Tune Motor	
Change Filters	
Adjust Brakes	
Rotate Tires	
Radiator Flush	
Wheel Alignment	

Check Clutch Operation

Remove & Replace Clutch Master Cyl
Remove & Replace Clutch Slave Cyl

Bleed as Required

2.0 @ 53.00 — 106 00

SUBCONTRACT

SUBCONTRACT TOTAL

I hereby authorize the above repair work to be done along with necessary materials. You and your employees may operate above vehicle for purposes of testing, inspection or delivery at my risk. An express mechanic's lien is acknowledged on above vehicle to secure the amount of repairs thereto. You will not be held responsible for loss or damage to vehicle or articles left in vehicle in case of fire, theft, accident or any other cause beyond your control.

Authorized By

FLUIDS	QTY.	PRICE
Gas		
Oil		
Grease		
Environmental		
Disposal		
FLUIDS TOTAL		

TOTAL LABOUR	106 00
TOTAL PARTS	222 92
TOTAL FLUIDS	
SHOP CHARGES	7 00
SUBCONTRACT	
SUBTOTAL	
GST	23 51
TOTAL	359 43

If you have ever taken a vehicle in for servicing, you likely studied the invoice you received. Invoices are prepared by service attendants who usually use computers and computer software prepared specifically for the auto-service industry. This software is an example of a specialized spreadsheet. If you are planning a career in automotives, you will use and interpret these spreadsheets as part of your daily routine.

MODULE SUMMARY

In this module you analyzed some of the costs, issues, and vocabulary associated with vehicle ownership and leasing.

In Section 1 you investigated the differences between purchasing and leasing. In your investigation you created and modified spreadsheet templates to explore different sets of circumstances in a variety of problem situations.

In Section 2 you extended your spreadsheet skills to explore costs of vehicle ownership, including depreciation, automobile maintenance and repair, and fuel. In addition, you explored vehicle insurance using such concepts as loss, compulsory coverage, optional coverage, deductibles, and claims records.

Purchasing or leasing a new vehicle for the first time is a real milestone in a young person's life. Because of the many choices available, the decision must be a careful one. You must consider not only styling, but also maintenance, economy, insurance costs, and how well the vehicle will hold its value. Before you make any decision, be sure to read consumer reports, comparison shop, and consult as many experts as possible. Good luck!

Assignment Booklet 2B and complete the Final Module Assignment.

When you are done, submit Assignment Booklet 2B to your teacher to be marked.

REVIEW

This Review will help you apply what you learned in Module 2 and prepare for the Final Test. Read the skills checklist for this module. Use this list to guide your study and to help you decide how much of the Review you should complete.

Skills Checklist

To Buy or To Lease?

- ❑ Use spreadsheet software to analyze leasing a vehicle under different circumstances.

The Costs of Owning a Vehicle

- ❑ Analyze car insurance needs and premiums using concepts such as loss, compulsory coverage, optional coverage, deductible, and claims record.
- ❑ Modify a spreadsheet template to input your own variables; for example, an invoice detailing costs of vehicle maintenance and repair.

Review Questions

1. Turn to pages 132 and 133 in your textbook. Do question 1 of "Review of Unit Two."
2. Val is planning to drive to Saskatoon on the long weekend. He estimates he will put 1200 km on his new car. His vehicle's fuel consumption is rated at 11 L/100 km. Gas is selling for 72.9 ¢/L. Use a spreadsheet to estimate his fuel costs.

Check your answers on pages 79 to 82 in the Appendix.

MATHEMATICS 24

Appendix

GLOSSARY

ANSWER KEY

IMAGE CREDITS

Glossary

amortization: the regular repayment of a loan

cell: the intersection of a row and a column in a spreadsheet

collision coverage: that part of an insurance policy that covers damage to your vehicle if the accident is your fault

column: a vertical line of cells identified by a letter at the top of a spreadsheet

comprehensive coverage: coverage for a full range of perils, such as theft, vandalism, and fire

deductible: the fixed amount the insurance policy does not cover

depreciated value: the reduced value of an asset, such as a vehicle, based on its age

depreciation: the decline in the value of an asset, such as a vehicle, over time

interest: the money earned by a deposit or the money in addition to the principal that must be paid back on a loan

interest rate: the percent used to calculate interest

personal and property liability coverage: that part of an insurance policy that covers another person's injury or damage to another person's property if the accident is your fault

principal: the original value of a loan or deposit

residual value: the fair market value of a vehicle at the time a lease expires

row: a horizontal line of cells identified by a number on the left-hand side of a spreadsheet

third-person liability coverage: personal and property liability coverage

Answer Key

Section 1: To Buy or To Lease?

Lesson 1: Buying a Car

1. Textbook, pages 95 and 96, "Investigation: How is the GST calculated?", questions 1 and 2

1. a. 7% of $\$22\,000.00 = 0.07 \times \$22\,000.00$

$= \$1540.00$

This is more than the value for GST in the table.

b. 7% of \$14 500.00 = 0.07 × \$14 500.00
= \$1015.00

c. The dealer charges GST on the difference between the selling price and the trade-in value. The amount of GST on the invoice matches 7% of \$14 500.00, not 7% of \$22 000.00.

2. a. If Ms. Kruger had sold her old car privately for \$7900.00, she would have paid \$15 640.00 – \$15 515.00 = \$125.00 more.

Selling Price	\$22 000.00
GST	\$1 540.00
Cost from Dealer	\$23 540.00
Less Sale of Old Car	\$7 900.00
Total Cost	\$15 640.00

b. Ms. Kruger would have had to sell her car privately for more than \$7900.00 + \$125.00 = \$8025.00 in order to pay less than she would if she sold her car to the dealer.

c. No, it is not always better to sell a vehicle than trade it in. It is better to trade your vehicle in if your savings in GST exceed the additional amount you would receive from a private sale compared to the trade-in value.

2. Textbook, pages 99 and 100, "Put into Practice," questions 1 to 3

1. a. Open your vehicle pricing spreadsheet. Clear the entries in column B except those in cells B15, B17, B18, and B19.

Enter the following values:

- In cell B1, enter 36640.
- In cell B3, enter 440.
- In cell B4, enter 805.
- In cell B5, enter 805.
- In cell B14, enter 100.
- In cell B16, enter 12000.

Your spreadsheet should look like the one shown to the right.

The final cost of Joanne's car is \$28 665.30.

	A	B
1	**Retail Price**	\$36640.00
2	**Options**	
3	Option 1	\$440.00
4	Option 2	\$805.00
5	Option 3	\$805.00
6	Option 4	
7	Option 5	
8	Option 6	
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	\$100.00
15	**Sub Total**	\$38790.00
16	Trade-in	\$12000.00
17	**Cost Before GST**	\$26790.00
18	GST	\$1875.30
19	**Cost After GST**	\$28665.30
20		

b. Open your vehicle pricing spreadsheet. Clear the entries in column B except those in cells B15, B17, B18, and B19.

Enter the values shown in cells B1, B3, B4, B5, B6, B7, B8, B14, and B16.

Your spreadsheet should look like the one shown to the right.

The final cost of Mike's vehicle is $27 349.20.

	A	B
1	**Retail Price**	$27230.00
2	**Options**	
3	Option 1	$645.00
4	Option 2	$1285.00
5	Option 3	$1320.00
6	Option 4	$515.00
7	Option 5	$800.00
8	Option 6	$165.00
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	$100.00
15	**Sub Total**	$32060.00
16	Trade-in	$6500.00
17	**Cost Before GST**	$25560.00
18	GST	$1789.20
19	**Cost After GST**	$27349.20
20		

c. Open your vehicle pricing spreadsheet. Clear the entries in column B except those in cells B15, B17, B18, and B19.

Enter the values shown in cells B1, B3, B4, B5, B14, and B16.

Your spreadsheet should look like the one shown to the right.

The final cost of Jodi's car is $17 842.25.

	A	B
1	**Retail Price**	$23000.00
2	**Options**	
3	Option 1	$1100.00
4	Option 2	$470.00
5	Option 3	$205.00
6	Option 4	
7	Option 5	
8	Option 6	
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	$100.00
15	**Sub Total**	$24875.00
16	Trade-in	$8200.00
17	**Cost Before GST**	$16675.00
18	GST	$1167.25
19	**Cost After GST**	$17842.25
20		

d. Open your vehicle pricing spreadsheet. Clear the entries in column B except those in cells B15, B17, B18, and B19.

Enter the values shown in cells B1, B3, B4, B5, B6, B7, B14, and B16.

Your spreadsheet should look like the one shown to the right.

The final cost of Jesse's car is $27 846.61.

	A	B
1	**Retail Price**	$25500.00
2	**Options**	
3	Option 1	$126.12
4	Option 2	$1153.32
5	Option 3	$131.92
6	Option 4	$146.67
7	Option 5	$366.84
8	Option 6	
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	$100.00
15	**Sub Total**	$27524.87
16	Trade-in	$1500.00
17	**Cost Before GST**	$26024.87
18	GST	$1821.74
19	**Cost After GST**	$27846.61
20		

2. a. Repeat the steps outlined in question 1 except do not enter the trade-in value in each case.

Your spreadsheet should look like the one shown to the right.

The final cost of Joanne's car, if she sells her truck privately for $13 100.00, is $41 505.30 – $13 100.00 = $28 405.30.

	A	B
1	**Retail Price**	$36640.00
2	**Options**	
3	Option 1	$440.00
4	Option 2	$805.00
5	Option 3	$805.00
6	Option 4	
7	Option 5	
8	Option 6	
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	$100.00
15	**Sub Total**	$38790.00
16	Trade-in	
17	**Cost Before GST**	$38790.00
18	GST	$2715.30
19	**Cost After GST**	$41505.30
20		

b. The final cost of Mike's truck, if he sells his current vehicle for $7000.00, is $34 304.20 – $7000.00 = $27 304.20.

Your spreadsheet should look like the one shown to the right.

	A	B
1	**Retail Price**	$27230.00
2	**Options**	
3	Option 1	$645.00
4	Option 2	$1285.00
5	Option 3	$1320.00
6	Option 4	$515.00
7	Option 5	$800.00
8	Option 6	$165.00
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	$100.00
15	**Sub Total**	$32060.00
16	Trade-in	
17	**Cost Before GST**	$32060.00
18	GST	$2244.20
19	**Cost After GST**	$34304.20
20		

c. The final cost of Jodi's Beetle, if she sells her current car for $8600.00, is $26 616.25 – $8600.00 = $18 016.25.

Your spreadsheet should look like the one shown to the right.

	A	B
1	**Retail Price**	$23000.00
2	**Options**	
3	Option 1	$1100.00
4	Option 2	$470.00
5	Option 3	$205.00
6	Option 4	
7	Option 5	
8	Option 6	
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	$100.00
15	**Sub Total**	$24875.00
16	Trade-in	
17	**Cost Before GST**	$24875.00
18	GST	$1741.25
19	**Cost After GST**	$26616.25
20		

d. The final cost of Jessie's new car, if his Civic sells for $1800.00, is $29 451.61 – $1800.00 = $27 651.61.

Your spreadsheet should look like the one shown to the right.

	A	B
1	**Retail Price**	$25500.00
2	**Options**	
3	Option 1	$126.12
4	Option 2	$1153.32
5	Option 3	$131.92
6	Option 4	$146.67
7	Option 5	$366.84
8	Option 6	
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	$100.00
15	**Sub Total**	$27524.87
16	Trade-in	
17	**Cost Before GST**	$27524.87
18	GST	$1926.74
19	**Cost After GST**	$29451.61
20		

3. Each person was wise to sell their vehicle privately. When deciding to sell your old vehicle privately or trade it in, you must consider the amount of GST you would save as compared to the additional money you might get from a private sale.

Lesson 2: Leasing a Vehicle

1. Textbook, page 103, "Investigation 1: How do I calculate the depreciation for a given year?", questions 1 and 2

1. For the third year, the residual is 50% of the original value of $17 313.08.

$$50\% \text{ of } \$17\,313.08 = 0.5 \times \$17\,313.08$$
$$= \$8656.54$$

$$\text{depreciation} = \text{value at the end of second year} - \text{value at the end of third year}$$
$$= \$9868.46 - \$8656.54$$
$$= \$1211.92$$

The depreciation for the third year is $1211.92.

For the fourth year, the residual is 44% of the original value.

$$44\% \text{ of } \$17\,313.08 = 0.44 \times \$17\,313.08$$
$$= \$7617.76$$

$$\text{depreciation} = \text{value at the end of third year} - \text{value at the end of fourth year}$$
$$= \$8656.54 - \$7617.76$$
$$= \$1038.78$$

The depreciation for the fourth year is $1038.78.

For the fifth year, the residual is 39% of the original value.

$$39\% \text{ of } \$17\,313.08 = 0.39 \times \$17\,313.08$$
$$= \$6752.10$$

$$\text{depreciation} = \text{value at the end of fourth year} - \text{value at the end of fifth year}$$
$$= \$7617.76 - \$6752.10$$
$$= \$865.66$$

The depreciation for year five is $865.66.

2. a. The depreciation for year 6 should be less than the depreciation for year five. Values around $690.00 to $700.00 would be reasonable.

b. Answers may vary.

2. Textbook, page 107, "Put into Practice," question 1

1. a. For the end of the first year, the residual is 70% of the original value.

$$70\% \text{ of } \$40\,000.00 = 0.7 \times \$40\,000.00$$
$$= \$28\,000.00$$

The residual is $28 000.00.

b. For the end of the third year, the residual is 50% of the original value.

$$50\% \text{ of } \$30\,000.00 = 0.5 \times \$30\,000.00$$
$$= \$15\,000.00$$

The residual is $15 000.00.

c. The residual at the end of the second year is 57% of the original value.

$$57\% \text{ of } \$20\,000.00 = 0.57 \times \$20\,000.00$$
$$= \$11\,400.00$$

The residual is $11 400.00.

d. The residual at the end of the fourth year is 44% of the original value.

$$44\% \text{ of } \$20\,000.00 = 0.44 \times \$20\,000.00$$
$$= \$8800.00$$

The residual is $8800.00.

e. The residual at the end of the fifth year is 39% of the original value.

$$39\% \text{ of } \$20\,000.00 = 0.39 \times \$20\,000.00$$
$$= \$7800.00$$

The residual is $7800.00.

3. Textbook, page 105, "Investigation 2: How do you calculate the amount after tax?"

The 1.07*B7 can be rewritten as $(1.0+0.07)$*B7. The 1.0 represents the monthly payment. The 0.07 represents the 7% GST.

4. Textbook, page 107, "Put into Practice," questions 2 and 3

2. Open your lease payment template. Enter the following values:

- Enter 23364.49 in cell B1.
- Enter 7.25 in cell B2.
- Enter 48 in cell B5.
- Enter 14000 in cell B6.

	A	B
1	**Purchase Price**	$23364.49
2	**Annual Interest Rate (%)**	7.25
3	**Annual Interest Rate (dec)**	0.0725
4	**Monthly Interest Rate**	0.00604167
5	**Lease Term (months)**	48
6	**Residual**	$14000.00
7	**Monthly Payment**	$308.05
8	**Monthly Payment + GST**	$329.62
9		

Gentry's monthly lease payment is $329.62.

3. a. First, calculate the residual after four years.

The residual at the end of the fourth year is 44% of the original value.

$$44\% \text{ of } \$22\,500.00 = 0.44 \times \$22\,500.00$$
$$= \$9900.00$$

Open your lease payment template. Enter the following values:

- Enter 22500 in cell B1.
- Enter 6.5 in cell B2.
- Enter 48 in cell B5.
- Enter 9900 in cell B6.

For a four-year term, Jay's monthly payment would be $375.07.

	A	B
1	**Purchase Price**	$22500.00
2	**Annual Interest Rate (%)**	6.5
3	**Annual Interest Rate (dec)**	0.065
4	**Monthly Interest Rate**	0.00541667
5	**Lease Term (months)**	48
6	**Residual**	$9900.00
7	**Monthly Payment**	$350.53
8	**Monthly Payment + GST**	$375.07
9		

Next, calculate the residual after five years. The residual at the end of the fifth year is 39% of the original value.

$$39\% \text{ of } \$22\,500.00 = 0.39 \times \$22\,500.00$$
$$= \$8775.00$$

Open your lease payment template. Enter the following values:

- Enter 22500 in cell B1.
- Enter 6.5 in cell B2.
- Enter 60 in cell B5.
- Enter 8775 in cell B6.

For a five-year term, Jay's monthly payment would be $336.38.

	A	B
1	**Purchase Price**	$22500.00
2	**Annual Interest Rate (%)**	6.5
3	**Annual Interest Rate (dec)**	0.065
4	**Monthly Interest Rate**	0.00541667
5	**Lease Term (months)**	60
6	**Residual**	$8775.00
7	**Monthly Payment**	$314.37
8	**Monthly Payment + GST**	$336.38
9		

b. Answers may vary. A sample answer is given.

A four-year lease commits Jay to one less year of payments. However, for a five-year lease, Jay's payments will be $375.07 – $336.38 or $38.69 a month less. And, at the end of the fifth year, the residual value will be $9900.00 – $8775.00 or $1125.00 less. Jay may be able to purchase the car at the end of the fifth year more easily by setting aside the money he saves because of the lower monthly payments.

However, for the four-year lease, Jay only pays a total of $48 \times \$336.38 = \$16\,146.24$.

Over the term of a five-year lease, Jay would pay a total of $60 \times \$375.07 = \$22\ 504.20$.

As well, if he chooses to buy the car, for a four-year lease he would pay a total of $26 046.24.

$$\begin{aligned}\$16\ 146.25 + \text{residual} &= \$16\ 146.24 + \$9900.00 \\ &= \$26\ 046.24\end{aligned}$$

For a five-year lease, to own the car he would pay a total of $31 279.20.

$$\begin{aligned}\$22\ 504.20 + \text{residual} &= \$22\ 504.20 + \$8775.00 \\ &= \$31\ 279.20\end{aligned}$$

What would you recommend to Jay?

Lesson 3: Financing a Car

1. A single payment at the end of the year would include interest based on the full amount of the loan, $5000.00. By making monthly payments, Alison reduces the amount owing and, therefore, the total interest she must pay.

2. a. The interest owing for the second month is based on the reduced principal, $4602.09.

$$\begin{aligned}I &= Prt \\ &= \$4602.09 \times 0.10 \times \frac{1}{12} \\ &= \$38.35\end{aligned}$$

Therefore, $38.35 of the monthly payment would go to interest at the end of the second month.

b. The amount of the monthly payment that would reduce the principal at the end of the second month is found by subtracting the interest owing from the monthly payment.

Therefore, $439.58 – $38.35 = $401.23 would be paid toward the principal.

The principal remaining at the end of the second month would be $4602.09 – $401.23 = $4200.86.

3. The interest owing for the third month is based on the reduced principal, $4200.86.

$$I = Prt$$
$$= \$4200.86 \times 0.10 \times \frac{1}{12}$$
$$= \$35.01$$

Therefore, $35.01 of the monthly payment would go to interest at the end of the third month.

The amount of the monthly payment that would reduce the principal would be $439.58 – $35.01 = $404.57.

The principal remaining at the end of the third month would be $4200.86 – $404.57 = $3796.29.

4. **Textbook, page 111, "Investigation 2: How much interest do you pay in the early months?", questions a. and b.**

a. The principal on which the interest is calculated for the second month is $18 196.25.

$$I = Prt$$
$$= \$18\,196.25 \times (0.08 \div 12) \times 1$$
$$= \$121.31$$

b. At the end of the second month, Vicky paid $452.25. She owed interest of $121.31. The total amount paid on the loan is $452.25 – $121.31 = $330.94.

The amount still owing at the beginning of the third month is $18 196.25 – $330.94 = $17 865.31.

5. **Textbook, page 118, "Put into Practice," questions 1.a., 1.b., 1.e., and 1.g. and question 2**

1. a. $I = Prt$
$= \$15\,500.00 \times (0.09 \div 12) \times 1$
$= \$116.25$

b. $I = Prt$
$= \$15\,500.00 \times (0.09 \div 12) \times 1$
$= \$116.25$

e. $I = Prt$
$= \$28\,550.00 \times (0.0875 \div 12) \times 1$
$= \$208.18$

g. $I = Prt$
$= \$28\,550.00 \times (0.029 \div 12) \times 1$
$= \$69.00$

2. a. The term of the loan does not affect the interest charged in the first month if the interest rate is the same.

b. The smaller the interest rate is, the lower the interest charged in the first month will be.

6. a.

Purchase Price	* $ 20000
Down Payment	* $ 0
Current Car – Trade-In Value	* $ 0
Annual Interest Rate (%/yr)	* 4.9 %
Loan Term	* 36
Sales Tax (GST + PST)	* 0 %

* Indicates field cannot be blank.

CALCULATE

Estimated Monthly Vehicle Payments $598.52

	A	B
1	**Purchase Price**	$20000.00
2	**Annual Interest Rate (%)**	4.9
3	**Annual Interest Rate (dec)**	0.049
4	**Monthly Interest Rate**	0.004083333
5	**Loan Term (months)**	36
6	**Monthly Payment**	$598.52

b.

Purchase Price	* $ 15000
Down Payment	* $ 0
Current Car – Trade-In Value	* $ 0
Annual Interest Rate (%/yr)	* 6 %
Loan Term	* 48
Sales Tax (GST + PST)	* 0 %

* Indicates field cannot be blank.

CALCULATE

Estimated Monthly Vehicle Payments $352.28

	A	B
1	**Purchase Price**	$15000.00
2	**Annual Interest Rate (%)**	6
3	**Annual Interest Rate (dec)**	0.06
4	**Monthly Interest Rate**	0.005
5	**Loan Term (months)**	48
6	**Monthly Payment**	$352.28

c.

Purchase Price	* $ 15000
Down Payment	* $ 0
Current Car – Trade-In Value	* $ 0
Annual Interest Rate (%/yr)	* 6 %
Loan Term	* 60
Sales Tax (GST + PST)	* 0 %

* Indicates field cannot be blank.

CALCULATE

Estimated Monthly Vehicle Payments $289.99

	A	B
1	**Purchase Price**	$15000.00
2	**Annual Interest Rate (%)**	6
3	**Annual Interest Rate (dec)**	0.06
4	**Monthly Interest Rate**	0.005
5	**Loan Term (months)**	60
6	**Monthly Payment**	$289.99

7. The monthly payment is lower in question 6.c. because you would be paying off the loan in five years instead of four years.

8. In question 6.b., the total paid would be 48 × $352.28 = $16 909.44. The interest paid would be $16 909.44 – $15 000.00 = $1909.44.

   In question 6.c., the total paid would be 60 × $289.99 = $17 399.40. The interest paid would be $17 399.40 – $15 000.00 = $2399.40.

   You would end up paying more interest in situation 6.c. You would pay $2399.40 – $1909.44 = $489.96 more interest.

9. **Textbook, pages 118 and 119, "Put into Practice," questions 3 and 4**

   3. a. Open your amortization spreadsheet. Modify the spreadsheet template for both the four-year and five-year terms as follows.

   Four-Year Term

	A	B	C	D	E	F
1	**Amount Borrowed**	$22500.00				
2	**Annual Interest Rate (%)**	6.5				
3	**Annual Interest Rate (dec)**	0.065				
4	**Monthly Interest Rate**	0.005416667				
5	**Number of Months**	48				
6	**Monthly Payment**	$533.59				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$22500.00	$121.88	$22621.88	$533.59	$22088.29
9	2	$22088.29	$119.64	$22207.93	$533.59	$21674.35
10	3	$21674.35	$117.40	$21791.75	$533.59	$21258.16
11	4	$21258.16	$115.15	$21373.31	$533.59	$20839.73
12	5	$20839.73	$112.88	$20952.61	$533.59	$20419.02
13	6	$20419.02	$110.60	$20529.62	$533.59	$19996.04
14	7	$19996.04	$108.31	$20104.35	$533.59	$19570.76
15	8	$19570.76	$106.01	$19676.77	$533.59	$19143.18
16	9	$19143.18	$103.69	$19246.88	$533.59	$18713.29
17	10	$18713.29	$101.36	$18814.65	$533.59	$18281.07
18	11	$18281.07	$99.02	$18380.09	$533.59	$17846.50
19	12	$17846.50	$96.67	$17943.17	$533.59	$17409.59
20	13	$17409.59	$94.30	$17503.89	$533.59	$16970.30
21	14	$16970.30	$91.92	$17062.22	$533.59	$16528.64
22	15	$16528.64	$89.53	$16618.17	$533.59	$16084.58
23	16	$16084.58	$87.12	$16171.71	$533.59	$15638.12
24	17	$15638.12	$84.71	$15722.83	$533.59	$15189.24
25						

24	17	$15633.12	$8[illegible]	$15[illegible]63	$533.59	$15[illegible]89.24
25	18	$15189.24	$82.28	$15271.51	$533.59	$14737.93
26	19	$14737.93	$79.83	$14817.76	$533.59	$14284.17
27	20	$14284.17	$77.37	$14361.54	$533.59	$13827.96
28	21	$13827.96	$74.90	$13902.86	$533.59	$13369.27
29	22	$13369.27	$72.42	$13441.69	$533.59	$12908.10
30	23	$12908.10	$69.92	$12978.02	$533.59	$12444.44
31	24	$12444.44	$67.41	$12511.84	$533.59	$11978.26
32	25	$11978.26	$64.88	$12043.14	$533.59	$11509.55
33	26	$11509.55	$62.34	$11571.90	$533.59	$11038.31
34	27	$11038.31	$59.79	$11098.10	$533.59	$10564.51
35	28	$10564.51	$57.22	$10621.74	$533.59	$10088.15
36	29	$10088.15	$54.64	$10142.80	$533.59	$9609.21
37	30	$9609.21	$52.05	$9661.26	$533.59	$9127.67
38	31	$9127.67	$49.44	$9177.11	$533.59	$8643.53
39	32	$8643.53	$46.82	$8690.35	$533.59	$8156.76
40	33	$8156.76	$44.18	$8200.94	$533.59	$7667.36
41	34	$7667.36	$41.53	$7708.89	$533.59	$7175.30
42	35	$7175.30	$38.87	$7214.17	$533.59	$6680.58
43	36	$6680.58	$36.19	$6716.77	$533.59	$6183.18
44	37	$6183.18	$33.49	$6216.67	$533.59	$5683.09
45	38	$5683.09	$30.78	$5713.87	$533.59	$5180.28
46	39	$5180.28	$28.06	$5208.34	$533.59	$4674.76
47	40	$4674.76	$25.32	$4700.08	$533.59	$4166.49
48	41	$4166.49	$22.57	$4189.06	$533.59	$3655.48
49	42	$3655.48	$19.80	$3675.28	$533.59	$3141.69
50	43	$3141.69	$17.02	$3158.71	$533.59	$2625.12
51	44	$2625.12	$14.22	$2639.34	$533.59	$2105.75
52	45	$2105.75	$11.41	$2117.16	$533.59	$1583.57
53	46	$1583.57	$8.58	$1592.15	$533.59	$1058.56
54	47	$1058.56	$5.73	$1064.30	$533.59	$530.71
55	48	$530.71	$2.87	$533.59	$533.59	$0.00
56			$3312.15			
57						

Five-Year Term

	A	B	C	D	E	F
1	**Amount Borrowed**	$22500.00				
2	**Annual Interest Rate (%)**	6.5				
3	**Annual Interest Rate (dec)**	0.065				
4	**Monthly Interest Rate**	0.005416667				
5	**Number of Months**	60				
6	**Monthly Payment**	$440.24				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$22500.00	$121.88	$22621.88	$440.24	$22181.64
9	2	$22181.64	$120.15	$22301.79	$440.24	$21861.55
10	3	$21861.55	$118.42	$21979.97	$440.24	$21539.73
11	4	$21539.73	$116.67	$21656.40	$440.24	$21216.16
12	5	$21216.16	$114.92	$21331.08	$440.24	$20890.84
13	6	$20890.84	$113.16	$21004.00	$440.24	$20563.77
14	7	$20563.77	$111.39	$20675.15	$440.24	$20234.91
15	8	$20234.91	$109.61	$20344.52	$440.24	$19904.28
16	9	$19904.28	$107.81	$20012.10	$440.24	$19571.86
17	10	$19571.86	$106.01	$19677.87	$440.24	$19237.63
18	11	$19237.63	$104.20	$19341.84	$440.24	$18901.60
19	12	$18901.60	$102.38	$19003.98	$440.24	$18563.74
20	13	$18563.74	$100.55	$18664.30	$440.24	$18224.06
21	14	$18224.06	$98.71	$18322.77	$440.24	$17882.54
22	15	$17882.54	$96.86	$17979.40	$440.24	$17539.16
23	16	$17539.16	$95.00	$17634.16	$440.24	$17193.93
24	17	$17193.93	$93.13	$17287.06	$440.24	$16846.82
25	18	$16846.82	$91.25	$16938.08	$440.24	$16497.84
26	19	$16497.84	$89.36	$16587.20	$440.24	$16146.96
27	20	$16146.96	$87.46	$16234.42	$440.24	$15794.19
28	21	$15794.19	$85.55	$15879.74	$440.24	$15439.50
29	22	$15439.50	$83.63	$15523.13	$440.24	$15082.89
30	23	$15082.89	$81.70	$15164.59	$440.24	$14724.35
31	24	$14724.35	$79.76	$14804.11	$440.24	$14363.87
32	25	$14363.87	$77.80	$14441.68	$440.24	$14001.44
33	26	$14001.44	$75.84	$14077.28	$440.24	$13637.04
34	27	$13637.04	$73.87	$13710.91	$440.24	$13270.67
35	28	$13270.67	$71.88	$13342.55	$440.24	$12902.31
36	29	$12902.31	$69.89	$12972.20	$440.24	$12531.96
37	30	$12531.96	$67.88	$12599.84	$440.24	$12159.61
38	31	$12159.61	$65.86	$12225.47	$440.24	$11785.23
39	32	$11785.23	$63.84	$11849.07	$440.24	$11408.83
40	33	$11408.83	$61.80	$11470.63	$440.24	$11030.39
41	34	$11030.39	$59.75	$11090.14	$440.24	$10649.90
42	35	$10649.90	$57.69	$10707.59	$440.24	$10267.35

42	35	$10649.90	$57.69	$10767.59	$440.24	$10267.35
43	36	$10267.35	$55.61	$10322.96	$440.24	$9882.72
44	37	$9882.72	$53.53	$9936.26	$440.24	$9496.02
45	38	$9496.02	$51.44	$9547.45	$440.24	$9107.22
46	39	$9107.22	$49.33	$9156.55	$440.24	$8716.31
47	40	$8716.31	$47.21	$8763.52	$440.24	$8323.28
48	41	$8323.28	$45.08	$8368.37	$440.24	$7928.13
49	42	$7928.13	$42.94	$7971.07	$440.24	$7530.84
50	43	$7530.84	$40.79	$7571.63	$440.24	$7131.39
51	44	$7131.39	$38.63	$7170.02	$440.24	$6729.78
52	45	$6729.78	$36.45	$6766.23	$440.24	$6325.99
53	46	$6325.99	$34.27	$6360.26	$440.24	$5920.02
54	47	$5920.02	$32.07	$5952.09	$440.24	$5511.85
55	48	$5511.85	$29.86	$5541.71	$440.24	$5101.47
56	49	$5101.47	$27.63	$5129.10	$440.24	$4688.86
57	50	$4688.86	$25.40	$4714.26	$440.24	$4274.02
58	51	$4274.02	$23.15	$4297.17	$440.24	$3856.93
59	52	$3856.93	$20.89	$3877.83	$440.24	$3437.59
60	53	$3437.59	$18.62	$3456.21	$440.24	$3015.97
61	54	$3015.97	$16.34	$3032.31	$440.24	$2592.07
62	55	$2592.07	$14.04	$2606.11	$440.24	$2165.87
63	56	$2165.87	$11.73	$2177.60	$440.24	$1737.36
64	57	$1737.36	$9.41	$1746.77	$440.24	$1306.54
65	58	$1306.54	$7.08	$1313.61	$440.24	$873.37
66	59	$873.37	$4.73	$878.10	$440.24	$437.87
67	60	$437.87	$2.37	$440.24	$440.24	$0.00
68			$3914.30			
69						

b. Answers will vary. A sample answer is given.

If Jay chooses a five-year term instead of a four-year term, his monthly payments will decrease from $533.59 to $440.24. However, for the four-year term, the total interest Jay would pay is $3312.15, which is $602.15 less than the $3914.30 in interest he would pay over five years.

4. a. Open your amortization spreadsheet. Enter the following values:

- In cell B1, enter 25000.
- In cell B2, enter 7.25.
- In cell B5, enter 48.

Your spreadsheet should look like the one that follows.

	A	B	C	D	E	F
1	**Amount Borrowed**	$25000.00				
2	**Annual Interest Rate (%)**	7.25				
3	**Annual Interest Rate (dec)**	0.0725				
4	**Monthly Interest Rate**	0.00604167				
5	**Number of Months**	48				
6	**Monthly Payment**	$601.56				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$25000.00	$151.04	$25151.04	$601.56	$24549.48
9	2	$24549.48	$148.32	$24697.80	$601.56	$24096.24
10	3	$24096.24	$145.58	$24241.82	$601.56	$23640.26
11	4	$23640.26	$142.83	$23783.09	$601.56	$23181.53
12	5	$23181.53	$140.06	$23321.58	$601.56	$22720.02
13	6	$22720.02	$137.27	$22857.29	$601.56	$22255.73
14	7	$22255.73	$134.46	$22390.19	$601.56	$21788.63
15	8	$21788.63	$131.64	$21920.27	$601.56	$21318.71
16	9	$21318.71	$128.80	$21447.51	$601.56	$20845.95
17	10	$20845.95	$125.94	$20971.90	$601.56	$20370.34
18	11	$20370.34	$123.07	$20493.41	$601.56	$19891.85
19	12	$19891.85	$120.18	$20012.03	$601.56	$19410.47
20	13	$19410.47	$117.27	$19527.74	$601.56	$18926.18
21	14	$18926.18	$114.35	$19040.52	$601.56	$18438.96
22	15	$18438.96	$111.40	$18550.37	$601.56	$17948.81
23	16	$17948.81	$108.44	$18057.25	$601.56	$17455.69
24	17	$17455.69	$105.46	$17561.15	$601.56	$16959.59
25	18	$16959.59	$102.46	$17062.05	$601.56	$16460.49
26	19	$16460.49	$99.45	$16559.94	$601.56	$15958.38
27	20	$15958.38	$96.42	$16054.80	$601.56	$15453.24
28	21	$15453.24	$93.36	$15546.60	$601.56	$14945.04
29	22	$14945.04	$90.29	$15035.33	$601.56	$14433.77
30	23	$14433.77	$87.20	$14520.98	$601.56	$13919.42
31	24	$13919.42	$84.10	$14003.51	$601.56	$13401.95
32	25	$13401.95	$80.97	$13482.92	$601.56	$12881.36
33	26	$12881.36	$77.82	$12959.19	$601.56	$12357.63
34	27	$12357.63	$74.66	$12432.29	$601.56	$11830.73
35	28	$11830.73	$71.48	$11902.21	$601.56	$11300.65
36	29	$11300.65	$68.27	$11368.92	$601.56	$10767.36
37	30	$10767.36	$65.05	$10832.41	$601.56	$10230.85
38	31	$10230.85	$61.81	$10292.66	$601.56	$9691.10
39	32	$9691.10	$58.55	$9749.65	$601.56	$9148.09
40	33	$9148.09	$55.27	$9203.36	$601.56	$8601.80
41	34	$8601.80	$51.97	$8653.77	$601.56	$8052.21
42	35	$8052.21	$48.65	$8100.86	$601.56	$7499.30
43	36	$7499.30	$45.31	$7544.61	$601.56	$6943.05
44	37	$6943.05	$41.95	$6985.00	$601.56	$6383.44

44	37	$6943.05	$41.95	$6985.00	$601.56	$6383.44
45	38	$6383.44	$38.57	$6422.00	$601.56	$5820.44
46	39	$5820.44	$35.17	$5855.61	$601.56	$5254.05
47	40	$5254.05	$31.74	$5285.79	$601.56	$4684.23
48	41	$4684.23	$28.30	$4712.53	$601.56	$4110.97
49	42	$4110.97	$24.84	$4135.81	$601.56	$3534.25
50	43	$3534.25	$21.35	$3555.60	$601.56	$2954.04
51	44	$2954.04	$17.85	$2971.89	$601.56	$2370.33
52	45	$2370.33	$14.32	$2384.65	$601.56	$1783.09
53	46	$1783.09	$10.77	$1793.86	$601.56	$1192.30
54	47	$1192.30	$7.20	$1199.51	$601.56	$597.95
55	48	$597.95	$3.61	$601.56	$601.56	$0.00
56						

b. The formula in cell C8 is =B8*$B$4. This formula calculates the interest to be paid at the end of the first month.

c. The formula in cell D8 is =B8+C8. This formula adds the month's opening balance to the month's interest to calculate the total amount owed.

d. The formula in cell F8 is =D8–E8. This formula calculates the amount owing after the monthly payment is made.

The formula in cell B9 is =F8. The amount owing at the end of the first month becomes the opening balance for the second month.

e.

51	44	$2954.04	$17.85	$2971.89	$601.56	$2370.33
52	45	$2370.33	$14.32	$2384.65	$601.56	$1783.09
53	46	$1783.09	$10.77	$1793.86	$601.56	$1192.30
54	47	$1192.30	$7.20	$1199.51	$601.56	$597.95
55	48	$597.95	$3.61	$601.56	$601.56	$0.00
56			**$3874.88**			
57						

From the spreadsheet, Gentry would pay $3874.88 in interest.

You could also determine the interest Gentry would pay by first finding the total paid. Simply multiply the monthly payment, $601.56, by 48, the number of payments.

$$\$601.56 \times 48 = \$28\ 874.88$$

Now subtract the original value of the loan from the total paid to determine the interest.

$$\$28\ 874.88 - \$25\ 000.00 = \$3874.88$$

f. Change the annual interest rate in cell B2 to 5.

Your spreadsheet should appear as follows.

	A	B	C	D	E	F
1	**Amount Borrowed**	$25000.00				
2	**Annual Interest Rate (%)**	5				
3	**Annual Interest Rate (dec)**	0.05				
4	**Monthly Interest Rate**	0.004166667				
5	**Number of Months**	48				
6	**Monthly Payment**	$575.73				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$25000.00	$104.17	$25104.17	$575.73	$24528.43
9	2	$24528.43	$102.20	$24630.64	$575.73	$24054.90
10	3	$24054.90	$100.23	$24155.13	$575.73	$23579.40
11	4	$23579.40	$98.25	$23677.65	$575.73	$23101.92
12	5	$23101.92	$96.26	$23198.17	$575.73	$22622.44
13	6	$22622.44	$94.26	$22716.70	$575.73	$22140.97
14	7	$22140.97	$92.25	$22233.22	$575.73	$21657.49
15	8	$21657.49	$90.24	$21747.73	$575.73	$21172.00
16	9	$21172.00	$88.22	$21260.21	$575.73	$20684.48
17	10	$20684.48	$86.19	$20770.67	$575.73	$20194.94
18	11	$20194.94	$84.15	$20279.08	$575.73	$19703.35
19	12	$19703.35	$82.10	$19785.45	$575.73	$19209.71
20	13	$19209.71	$80.04	$19289.75	$575.73	$18714.02
21	14	$18714.02	$77.98	$18792.00	$575.73	$18216.26
22	15	$18216.26	$75.90	$18292.17	$575.73	$17716.43
23	16	$17716.43	$73.82	$17790.25	$575.73	$17214.52
24	17	$17214.52	$71.73	$17286.25	$575.73	$16710.51
25	18	$16710.51	$69.63	$16780.14	$575.73	$16204.41
26	19	$16204.41	$67.52	$16271.93	$575.73	$15696.19
27	20	$15696.19	$65.40	$15761.60	$575.73	$15185.86
28	21	$15185.86	$63.27	$15249.14	$575.73	$14673.41
29	22	$14673.41	$61.14	$14734.54	$575.73	$14158.81
30	23	$14158.81	$59.00	$14217.81	$575.73	$13642.07
31	24	$13642.07	$56.84	$13698.92	$575.73	$13123.18
32	25	$13123.18	$54.68	$13177.86	$575.73	$12602.13
33	26	$12602.13	$52.51	$12654.64	$575.73	$12078.91
34	27	$12078.91	$50.33	$12129.24	$575.73	$11553.51
35	28	$11553.51	$48.14	$11601.64	$575.73	$11025.91
36	29	$11025.91	$45.94	$11071.85	$575.73	$10496.12
37	30	$10496.12	$43.73	$10539.86	$575.73	$9964.12
38	31	$9964.12	$41.52	$10005.64	$575.73	$9429.91
39	32	$9429.91	$39.29	$9469.20	$575.73	$8893.47
40	33	$8893.47	$37.06	$8930.52	$575.73	$8354.79

40	33	$8893.47	$37.06	$8930.52	$575.73	$8354.79
41	34	$8354.79	$34.81	$8389.60	$575.73	$7813.87
42	35	$7813.87	$32.56	$7846.43	$575.73	$7270.70
43	36	$7270.70	$30.29	$7300.99	$575.73	$6725.26
44	37	$6725.26	$28.02	$6753.28	$575.73	$6177.55
45	38	$6177.55	$25.74	$6203.29	$575.73	$5627.55
46	39	$5627.55	$23.45	$5651.00	$575.73	$5075.27
47	40	$5075.27	$21.15	$5096.42	$575.73	$4520.68
48	41	$4520.68	$18.84	$4539.52	$575.73	$3963.79
49	42	$3963.79	$16.52	$3980.30	$575.73	$3404.57
50	43	$3404.57	$14.19	$3418.76	$575.73	$2843.03
51	44	$2843.03	$11.85	$2854.87	$575.73	$2279.14
52	45	$2279.14	$9.50	$2288.64	$575.73	$1712.90
53	46	$1712.90	$7.14	$1720.04	$575.73	$1144.31
54	47	$1144.31	$4.77	$1149.08	$575.73	$573.34
55	48	$573.34	$2.39	$575.73	$575.73	$0.00
56			$2635.15			
57						

g. Gentry would pay $2635.15 in interest if he borrowed from the credit union. This amount is $3874.88 – $2635.15 = $1239.73 less than the loan would cost if he borrowed from the finance company.

Lesson 4: Buy or Lease?

1. Textbook, page 122, "Investigation: What will it cost Vicky if she leases and pays the residual?"

From the example on page 121 of your textbook, Vicky must save $174.39 per month for 48 months to save $8151 plus GST to purchase her vehicle at the end of her lease.

$$\begin{aligned}\text{her monthly total} &= \text{lease payment} + \text{savings deposit}\\ &= \$326.95 + \$174.39\\ &= \$501.34\end{aligned}$$

Her payments to purchase the vehicle outright are only $452.25. She should not lease the vehicle if she plans to buy it at the end of the term of the lease.

2. Textbook, pages 122 and 123, "Put into Practice," questions 1 to 3

1. a. Use the savings template.

	A	B
1	Starting Amount	$0.00
2	Annual Interest Rate (%)	1.75
3	Annual Interest Rate (dec)	0.0175
4	Monthly Interest Rate	0.00146
5	Savings Term (months)	48
6	Residual + GST	$1000.00
7	Monthly Deposit	$20.10

The monthly deposit is $20.10.

b. Use the savings template.

	A	B
1	Starting Amount	$0.00
2	Annual Interest Rate (%)	2.25
3	Annual Interest Rate (dec)	0.0225
4	Monthly Interest Rate	0.00188
5	Savings Term (months)	48
6	Residual + GST	$8000.00
7	Monthly Deposit	$159.14

The monthly deposit is $159.14.

c. Use the savings template.

	A	B
1	Starting Amount	$0.00
2	Annual Interest Rate (%)	2.25
3	Annual Interest Rate (dec)	0.0225
4	Monthly Interest Rate	0.00188
5	Savings Term (months)	24
6	Residual + GST	$8000.00
7	Monthly Deposit	$325.59

The monthly deposit is $325.59.

d. Use the savings template.

	A	B
1	Starting Amount	$0.00
2	Annual Interest Rate (%)	2.25
3	Annual Interest Rate (dec)	0.0225
4	Monthly Interest Rate	0.00188
5	Savings Term (months)	96
6	Residual + GST	$8000.00
7	Monthly Deposit	$75.99

The monthly deposit is $75.99.

2. a. The GST is 7%. The total Todd must borrow is $26 899.80.

$$107\% \text{ of } \$25\,140.00 = 1.07 \times \$25\,140.00$$
$$= \$26\,899.80$$

b. Use your car payment spreadsheet.

Todd's monthly payment would be $841.70.

	A	B
1	Amount Borrowed	$26899.80
2	Annual Interest Rate (%)	7.9
3	Annual Interest Rate (dec)	0.079
4	Monthly Interest Rate	0.006583
5	Number of Months	36
6	Monthly Payment	$841.70

c. residual + GST = \$12 570.00 + (0.07 × \$12 570.00)

= \$13 449.90

Use your savings spreadsheet.

Todd must deposit \$362.22 each month to save for the residual and the GST.

	A	B
1	**Starting Amount**	\$0.00
2	**Annual Interest Rate (%)**	2
3	**Annual Interest Rate (dec)**	0.02
4	**Monthly Interest Rate**	0.00167
5	**Savings Term (months)**	36
6	**Residual + GST**	\$13449.90
7	**Monthly Deposit**	\$362.22

d. If Todd plans to purchase the vehicle after the lease expires, his monthly commitment is \$868.29.

lease payments + savings = \$506.07 + \$362.22

= \$868.29

This is more than the \$841.70 he needs to buy the vehicle outright. Todd should buy rather than lease.

3. a. Gentry will need to borrow 107% of \$23 364.49 = \$25 000.00.

b. Use your car payment spreadsheet.

Gentry's monthly payment would be \$601.56.

	A	B
1	**Amount Borrowed**	\$25000.00
2	**Annual Interest Rate (%)**	7.25
3	**Annual Interest Rate (dec)**	0.0725
4	**Monthly Interest Rate**	0.006042
5	**Number of Months**	48
6	**Monthly Payment**	\$601.56

c. residual + GST = \$14 000.00 + (0.07 × \$14 000.00)

= \$14 980.00

Use your savings spreadsheet.

Gentry must save \$299.53 each month to save for the residual and the GST.

	A	B
1	**Starting Amount**	\$0.00
2	**Annual Interest Rate (%)**	2
3	**Annual Interest Rate (dec)**	0.02
4	**Monthly Interest Rate**	0.00167
5	**Savings Term (months)**	48
6	**Residual + GST**	\$14980.00
7	**Monthly Deposit**	\$299.53

d. If Gentry plans to buy after leasing, his monthly commitment is $629.15.

$$\text{lease payment} + \text{savings} = \$329.62 + \$299.53$$
$$= \$629.15$$

This is more than the $601.56 he needs to buy the vehicle outright. Gentry should buy rather than lease.

Section 2: The Costs of Owning a Vehicle

Lesson 1: Vehicle Insurance

Textbook, page 125, questions a. to f.

a. The quote will increase if you increase the liability limit to $2 000 000.00 from $1 000 000.00.

b. The quote will increase significantly after two or more minor offences. The amount of the increase depends on the insurance company and your personal circumstances.

c. Yes, the number of kilometres driven changes the quote. The quote increases the more the vehicle is driven, if the vehicle is used to commute to work, and if the distance to work increases.

d. If you have completed a driver-training course, your insurance rates should decrease.

e. Your insurance premiums will decrease if you increase the deductible.

f. Theft protection should lower your quote. Check with your insurance company for the amount in question.

Lesson 2: Other Costs of Ownership

1. Textbook, page 127, "Put into Practice 1," questions 1 and 2

1. a. Enter 24550 in cell B2.

	A	B
1	**Age (years)**	**Value ($)**
2	New	$24550.00
3	1 year	$17185.00
4	2 years	$13993.50
5	3 years	$12275.00
6	4 years	$10802.00
7	5 years	$9574.50
8		

b. The car has lost $24 550.00 – $9574.50 or $14 975.50 of its value after five years.

2. a. Enter 42365 in cell B2.

	A	B
1	**Age (years)**	**Value ($)**
2	New	$42365.00
3	1 year	$29655.50
4	2 years	$24148.05
5	3 years	$21182.50
6	4 years	$18640.60
7	5 years	$16522.35

b. The car has lost $42 365.00 – $16 522.35 or $25 842.65 of its value after five years.

2. Open your vehicle depreciation for tax purposes spreadsheet.

- Enter 45000 in cell B3.
- Fill down to 8 years.

	A	B	C	D
1	**Vehicle Depreciation for Tax Purposes**			
2				
3	**Purchase Price**	$45000.00		
4	**Depreciation Rate (%)**	30		
5				
6	**Number of Years**	**Initial Value**	**Depreciation**	**Value at End of the Year**
7	1	$45000.00	$13500.00	$31500.00
8	2	$31500.00	$9450.00	$22050.00
9	3	$22050.00	$6615.00	$15435.00
10	4	$15435.00	$4630.50	$10804.50
11	5	$10804.50	$3241.35	$7563.15
12	6	$7563.15	$2268.95	$5294.21
13	7	$5294.21	$1588.26	$3705.94
14	8	$3705.94	$1111.78	$2594.16

The depreciation in the eighth year is $1111.78.

3. Determine the cost of gasoline if Lise drove her parent's van.

- Enter 6200 in cell B3.
- Enter 11.8 in cell B4.
- Enter 76 in cell B5.

The cost of gasoline for the van would be $556.02.

	A	B
1	**Fuel Costs**	
2		
3	**Distance Driven**	6200
4	**Fuel Consumption Rate/100 km**	11.8
5	**Cost per Litre**	76
6	**Total Cost**	$556.02

Determine the cost of gasoline if Lise drove her economy car.

- Enter 6200 in cell B3.
- Enter 6.5 in cell B4.
- Enter 76 in cell B5.

The cost of gasoline for Lise's economy car would be $306.28. Lise would save $556.02 – $306.28 or $249.74 if she drove her economy car.

	A	B
1	**Fuel Costs**	
2		
3	**Distance Driven**	6200
4	**Fuel Consumption Rate/100 km**	6.5
5	**Cost per Litre**	76
6	**Total Cost**	$306.28
7		

4. Textbook, page 131, "Put into Practice 2," questions 3 to 6

3. Enter 66.50 in cell F20.

	A	B	C	D	E	F
1	**Otto's Auto Repair Ltd.**					
2	**Work Order**					
3	**Parts**			**Labour**		
4	**Description**	**Price ($)**		**Description**	**Hours**	**Cost ($)**
5	Timing Cover Gasket	6.70		Towing	2.50	166.25
6	Timing Belt	18.42		Ignition system update and retest	1.25	83.12
7	Tension Roller	100.94		Replace timing belt, water pump and seal	6.75	448.88
8	Water Pump	106.25		Replace rear brakes, pads, rotors	3.00	199.50
9	Belt	8.40		**Total Labour**		897.75
10	Coolant	11.00				
11	Brake Pads	50.00				
12	Rotors	102.50				
13	**Total Parts**	404.21				
14						
15	**Parts Total**	404.21				
16	**Labour Total**	897.75				
17	Shop Supplies	8.98				
18	**Subtotal**	1310.94				
19	GST	91.77				
20	**Total**	1402.70		Labour Rate		66.50

The total labour is $897.75 and the total repair is $1402.70.

4. Enter the values as shown in the following invoice.

- Enter 70.00 in cell F20.
- Enter Tune-up in cells A5 and D5.
- Enter Flush Power Steering in cells A6 and D6.
- Enter Electrical Diagnosis in cell D7.
- Enter 51.00 in cell B5.
- Enter 7.09 in cell B6.
- Enter 3.00 in cell E5.
- Enter 0.75 in cell E6.
- Enter 0.50 in cell E7.

	A	B	C	D	E	F
1	**Otto's Auto Repair Ltd.**					
2	**Work Order**					
3	**Parts**			**Labour**		
4	**Description**	**Price ($)**		**Description**	**Hours**	**Cost ($)**
5	Tune-up	51.00		Tune-up	3.00	210.00
6	Flush Power Steering	7.09		Flush Power Steering	0.75	52.50
7				Electrical Diagnosis	0.50	35.00
8						0.00
9				**Total Labour**		297.50
10						
11						
12						
13	**Total Parts**	58.09				
14						
15	**Parts Total**	58.09				
16	**Labour Total**	297.50				
17	Shop Supplies	2.98				
18	**Subtotal**	358.57				
19	GST	25.10				
20	**Total**	383.66		Labour Rate		70.00

Note: The total is actually $383.67. Rounding in the spreadsheet has made the sum come out 1¢ too small.

The total cost of the repairs is $383.67.

5. Modify the spreadsheet from question 4 as follows:

- Enter 10% Discount in cell A14.
- Enter =0.10*B13 in cell B14.
- Enter =B13–B14 in cell B15.

	A	B	C	D	E	F
1	**Otto's Auto Repair Ltd.**					
2	**Work Order**					
3	**Parts**			**Labour**		
4	**Description**	**Price ($)**		**Description**	**Hours**	**Cost ($)**
5	Tune-up	51.00		Tune-up	3.00	210.00
6	Flush Power Steering	7.09		Flush Power Steering	0.75	52.50
7				Electrical Diagnosis	0.50	35.00
8						0.00
9				**Total Labour**		297.50
10						
11						
12						
13	**Total Parts**	58.09				
14	10% Discount	5.81				
15	**Parts Total**	52.28				
16	**Labour Total**	297.50				
17	Shop Supplies	2.98				
18	**Subtotal**	352.76				
19	GST	24.69				
20	**Total**	377.45		Labour Rate		70.00

The total repair is $377.45.

6. The advantages of using a spreadsheet are as follows:

- You only have to change the entries for parts, labour, and the formula for Shop Supplies.

- The calculations are performed automatically.

Review

1. Textbook, pages 132 and 133, "Review of Unit Two," question 1

1. a. Open your vehicle pricing spreadsheet. Enter the following values:

- Enter 27250 in cell B1.
- Enter 100 in cell B14.
- Enter 3650 in cell B16.

The total cost of the Chrysler PT Cruiser is $25 359.00.

	A	B
1	**Retail Price**	$27250.00
2	**Options**	
3	Option 1	
4	Option 2	
5	Option 3	
6	Option 4	
7	Option 5	
8	Option 6	
9	Option 7	
10	Option 8	
11	Option 9	
12	Option 10	
13	**Taxes**	
14	Air Conditioning	$100.00
15	**Sub Total**	$27350.00
16	Trade-in	$3650.00
17	**Cost Before GST**	$23700.00
18	GST	$1659.00
19	**Cost After GST**	$25359.00

b. Open your amortization spreadsheet. Enter the following values:

- Enter 25359 in cell B1.
- Enter 3.5 in cell B2.
- Enter 48 in cell B5.

	A	B	C	D	E	F
1	**Amount Borrowed**	$25359.00				
2	**Annual Interest Rate (%)**	3.5				
3	**Annual Interest Rate (dec)**	0.035				
4	**Monthly Interest Rate**	0.002917				
5	**Number of Months**	48				
6	**Monthly Payment**	$566.93				
7	**Payment Number**	**Opening Balance**	**Interest Charged**	**Amount Owed**	**Payment**	**New Balance**
8	1	$25359.00	$73.96	$25432.96	$566.93	$24866.04
9	2	$24866.04	$72.53	$24938.56	$566.93	$24371.64
10	3	$24371.64	$71.08	$24442.72	$566.93	$23875.80
11	4	$23875.80	$69.64	$23945.43	$566.93	$23378.51
12	5	$23378.51	$68.19	$23446.70	$566.93	$22879.77
13	6	$22879.77	$66.73	$22946.50	$566.93	$22379.58

13	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	7	$22379.58	$65.27	$22444.85	$566.93	$21877.92
15	8	$21877.92	$63.81	$21941.73	$566.93	$21374.81
16	9	$21374.81	$62.34	$21437.15	$566.93	$20870.23
17	10	$20870.23	$60.87	$20931.10	$566.93	$20364.17
18	11	$20364.17	$59.40	$20423.57	$566.93	$19856.64
19	12	$19856.64	$57.92	$19914.56	$566.93	$19347.63
20	13	$19347.63	$56.43	$19404.06	$566.93	$18837.14
21	14	$18837.14	$54.94	$18892.08	$566.93	$18325.15
22	15	$18325.15	$53.45	$18378.60	$566.93	$17811.67
23	16	$17811.67	$51.95	$17863.62	$566.93	$17296.70
24	17	$17296.70	$50.45	$17347.15	$566.93	$16780.22
25	18	$16780.22	$48.94	$16829.16	$566.93	$16262.24
26	19	$16262.24	$47.43	$16309.67	$566.93	$15742.74
27	20	$15742.74	$45.92	$15788.66	$566.93	$15221.73
28	21	$15221.73	$44.40	$15266.13	$566.93	$14699.21
29	22	$14699.21	$42.87	$14742.08	$566.93	$14175.15
30	23	$14175.15	$41.34	$14216.50	$566.93	$13649.57
31	24	$13649.57	$39.81	$13689.38	$566.93	$13122.46
32	25	$13122.46	$38.27	$13160.73	$566.93	$12593.80
33	26	$12593.80	$36.73	$12630.54	$566.93	$12063.61
34	27	$12063.61	$35.19	$12098.80	$566.93	$11531.87
35	28	$11531.87	$33.63	$11565.50	$566.93	$10998.58
36	29	$10998.58	$32.08	$11030.66	$566.93	$10463.73
37	30	$10463.73	$30.52	$10494.25	$566.93	$9927.33
38	31	$9927.33	$28.95	$9956.28	$566.93	$9389.35
39	32	$9389.35	$27.39	$9416.74	$566.93	$8849.81
40	33	$8849.81	$25.81	$8875.63	$566.93	$8308.70
41	34	$8308.70	$24.23	$8332.93	$566.93	$7766.01
42	35	$7766.01	$22.65	$7788.66	$566.93	$7221.73
43	36	$7221.73	$21.06	$7242.80	$566.93	$6675.87
44	37	$6675.87	$19.47	$6695.34	$566.93	$6128.42
45	38	$6128.42	$17.87	$6146.29	$566.93	$5579.36
46	39	$5579.36	$16.27	$5595.64	$566.93	$5028.71
47	40	$5028.71	$14.67	$5043.38	$566.93	$4476.45
48	41	$4476.45	$13.06	$4489.51	$566.93	$3922.58
49	42	$3922.58	$11.44	$3934.02	$566.93	$3367.10
50	43	$3367.10	$9.82	$3376.92	$566.93	$2809.99
51	44	$2809.99	$8.20	$2818.19	$566.93	$2251.26
52	45	$2251.26	$6.57	$2257.83	$566.93	$1690.90
53	46	$1690.90	$4.93	$1695.84	$566.93	$1128.91
54	47	$1128.91	$3.29	$1132.20	$566.93	$565.28
55	48	$565.28	$1.65	$566.93	$566.93	$0.00
56						

Jennifer's monthly payments will be $566.93.

c. The lease payment would be based on the difference between the retail cost of the vehicle and her trade in plus the air-conditioning tax.

$$\text{retail cost} - \text{trade in} + \text{air-conditioning tax} = \$27\,250.00 - \$3650.00 + \$100.00$$
$$= \$23\,700.00$$

Open your lease payment spreadsheet. Enter the following values:

- Enter 23700 in cell B1.
- Enter 3.5 in cell B2.
- Enter 48 in cell B5.
- Enter 13625 in cell B6.

	A	B
1	**Purchase Price**	$23700.00
2	**Annual Interest Rate (%)**	3.5
3	**Annual Interest Rate (dec)**	0.035
4	**Monthly Interest Rate**	0.00291667
5	**Lease Term (months)**	48
6	**Residual**	$13625.00
7	**Monthly Payment**	$264.21
8	**Monthly Payment + GST**	$282.70

The residual is 50% of the retail cost.

$$50\% \text{ of } \$27\,250.00 = 0.5 \times \$27\,250.00$$
$$= \$13\,625.00$$

Jennifer's lease payment would be $282.70.

d. Leasing is $566.93 – $282.70 or $284.23 less expensive per month than buying. However, if Jennifer wants to own the vehicle after the lease expires, she will have to pay the residual $13 625 plus GST.

Open the savings spreadsheet to see how much she must save each month to buy the vehicle at the end of her lease.

$$\text{residual} + \text{GST} = 1.07 \times \$13\,625.00$$
$$= \$14\,578.75$$

- Enter 1.9 in cell B2.
- Enter 48 in cell B5.
- Enter 14 578.75 in cell B6.

	A	B
1	**Starting Amount**	$0.00
2	**Annual Interest Rate (%)**	1.9
3	**Annual Interest Rate (dec)**	0.019
4	**Monthly Interest Rate**	0.00158
5	**Savings Term (months)**	48
6	**Residual + GST**	$14578.75
7	**Monthly Deposit**	$292.11

Jennifer must save $292.11 each month.

The amount she must save plus her lease payment total $282.70 + $292.11 or $574.81, which is more than her monthly payment, $566.93, to purchase the vehicle.

Jennifer should buy rather than lease.

e. Answers will vary. Check websites for quotes.

f. Use the invoice spreadsheet you created in Section 2: Lesson 2.

	A	B	C	D	E	F
1	**Otto's Auto Repair Ltd.**					
2	**Work Order**					
3	**Parts**			**Labour**		
4	**Description**	**Price ($)**		**Description**	**Hours**	**Cost ($)**
5	Bumper	450.00		Painting and Installation of Bumper	2.30	106.95
6	Reinforcing Bar	215.00		Installation of Reinforcing Bar	1.10	51.15
7						0.00
8						0.00
9				**Total Labour**		158.10
10						
11						
12						
13	**Total Parts**	665.00				
14						
15	**Parts Total**	665.00				
16	**Labour Total**	158.10				
17	Shop Supplies	0.00				
18	**Subtotal**	823.10				
19	GST	57.62				
20	**Total**	880.72		Labour Rate		46.50

The total repairs are $880.72.

2. Open the fuel costs spreadsheet. Enter the following values:

- Enter 1200 in cell B3.
- Enter 11 in cell B4.
- Enter 72.9 in cell B5.

The fuel costs total $96.23.

	A	B
1	**Fuel Costs**	
2		
3	**Distance Driven**	1200
4	**Fuel Consumption Rate/100 km**	11
5	**Cost per Litre**	72.9
6	**Total Cost**	$96.23
7		

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Spreadsheets

Following is a list of the spreadsheet templates for Module 2 that appear on the multimedia CD:

- Mod_2_1.xlt calculating the cost of a new car
- Mod_2_2.xlt finding monthly lease costs of a car
- Mod_2_3.xlt finding monthly payments for a loan
- Mod_2_4.xlt amortizing a loan (uses a macro)
- Mod_2_5.xlt calculating monthly savings needed to buy out a lease
- Mod_2_6.xlt calculating depreciation of a new car
- Mod_2_7.xlt calculating depreciation of a car for tax purposes
- Mod_2_8.xlt calculating fuel costs of a car trip
- Mod_2_9.xlt completing a garage work order
- Rounds.xlt comparing different rounding methods (uses a macro)

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